Volume 37 • SEPTEMBER, 1956 • No. 9

Archives of PHYSICAL MEDICINE *and* REHABILITATION

ORIGINAL ARTICLES

Effect of Ischemia and Curare on Spasticity. Dorothy M. Stillwell, M.D., and Jerome W. Gersten, M.D. 533

•

The Influence of Syncardial Massage on the Peripheral Circulation. Khalil G. Wakim, M.D., Ph.D.; Justus F. K. Lehmann, M.D.; Newton C. Birkhead, M.D.; Frank H. Krusen, M.D., and Edgar V. Allen, M.D. 538

•

Role of the Federal Government in Vocational Rehabilitation. Mary E. Switzer ... 542

•

Problems of Management in the Placement of Handicapped Workers. Earl R. Bramblett. 547

•

Clinical Note: A Versatile Goniometer. Frederic J. Kottke, M.D. 549

•

Experiences with Bobath Method of Treatment of Cerebral Palsy. Odon F. von Werssowetz, M.D.; Empress Y. Zedler, Ph.D.; Christine V. Burton, B.S., O.T.R., and Hector D. Lozano, B.S., R.P.T. 550

•

Painful Shoulder Syndrome Following Cardiac Surgery. Edward J. Lorenze, III, M.D. 555

•

Extracardial Somatic Factors in the Etiology of Myocardial Ischemia. Case Report. H. I. Weiser, M.D. 560

•

Medical News 562

•

Physical Medicine Abstracts 567

•

Book Reviews 575

•

Editor of the Month

PAUL A. NELSON, M.D.

Cleveland

ANNUAL SESSION • LOS ANGELES • SEPT. 8-13, 1957

CARDIOSCOPE Cs-3 5

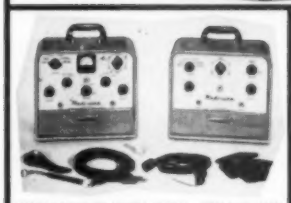
CARDIOPHONE CP-3 6

CARDIAC PACEMAKER CPM

CARDIAC DEFIBRILLATOR CD

Dallons *Complete line*

PHYSICAL MEDICINE and CARDIOLOGICAL Equipment

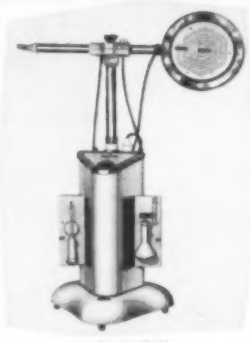


MEDI-SINE with GALVANISM-1400MG MEDI-SINE-1400M

MEDI-SONAR PORTABLE 1100

MEDI-SONAR CONSOLE 1050

MEDITHERM 1600



ULTRA VIOLET 600

Dallons

respected for more than 25 years for their many valuable contributions to the science of physical medicine, is constantly increasing the number and scope of its products, making it possible to offer one of the most complete lines available.

All Dallons equipment is sold only through carefully selected franchised surgical supply dealers.

For descriptive literature write to manufacturer.

For the Best in Medical Electronics —*Specify DALLONS*

DALLONS LABORATORIES, INC.

5066 Santa Monica Blvd., Los Angeles 29, Calif.

MAIL THIS COUPON TODAY!

Please mail FREE literature to: (BCL)

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

I'm interested in: _____

_____

_____

My preferred surgical supply: _____

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION

30 North Michigan Avenue, Chicago 2, Illinois

OFFICIAL JOURNAL
AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION
AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

Original contributions, exchanges and books for review should be forwarded to the Editorial Office. All business matters including advertising should be handled through the Executive Office, 30 N. Michigan Ave., Chicago 2, Illinois. The statements in the manuscripts published in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are made solely on the responsibility of the author. The American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation does not assume any responsibility for statements contained therein. Manuscripts accepted for publication in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION are for exclusive publication and may not be published elsewhere.

OFFICERS

American Congress of Physical Medicine and Rehabilitation

GORDON M. MARTIN, M.D.
Rochester, Minn., President
A.B.C. KNUDSON, M.D.
Washington, D.C., President-Elect
DONALD L. ROSE, M.D.
Kansas City, Kans., First Vice-President
ARTHUR C. JONES, M.D.
Portland, Ore., Second Vice-President
FREDERIC J. KOTTKE, M.D.
Minneapolis, Third Vice-President
DONALD A. COVALT, M.D.
New York, Fourth Vice-President
DONALD J. ERICKSON, M.D.
Rochester, Minn., Fifth Vice-President
FRANCES BAKER, M.D.
San Mateo, Calif., Secretary
FRANK H. KRUSEN, M.D.
Rochester, Minn., Treasurer
WALTER J. ZEITER, M.D.
Cleveland, Executive Director
DOROTHEA C. AUGUSTIN
Chicago, Executive Secretary

EXECUTIVE COUNCIL

William D. Paul, M.D., Iowa City, Chairman.
Norman E. Titus, M.D., Savannah, Ga., Secretary.
Robert L. Bennett, M.D., Warm Springs, Ga.
William Bierman, M.D., New York.
Earl C. Elkins, M.D., Rochester, Minn.
Kristian G. Hansson, M.D., New York.
John Severy Hibben, M.D., Pasadena.
Abraham R. Hollender, M.D., Miami Beach, Fla.
O. Leonard Huddleston, M.D., Santa Monica, Calif.
H. Worley Kendell, M.D., Peoria, Ill.
Miland E. Knapp, M.D., Minneapolis.
Frank H. Krusen, M.D., Rochester, Minn.
Walter S. McClellan, M.D., Chapel Hill, N. C.
Fred B. Moor, M.D., Los Angeles.
Nathan H. Polmer, M.D., New Orleans.
William H. Schmidt, M.D., Philadelphia.
Wm. Benham Snow, M.D., New York.
Arthur L. Watkins, M.D., Boston.
Gordon M. Martin, M.D., Rochester, Minn., Ex-Officio

Subscription—In the United States, its possessions, and Mexico, $7.00 yearly; Canada, $8.00; elsewhere, $14.00 the year; $0.75 per single copy. Advertising rates on application. All advertising copy subject to acceptance by Publication Committee.

COPYRIGHT: Matter appearing in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is covered by copyright. Permission will be granted on request for reproduction in reputable publications if proper credit is given. Reproduction for commercial purposes will not be permitted.

Published monthly at Chicago, Illinois, by the American Congress of Physical Medicine and Rehabilitation. Entered as Second Class Matter at the Post Office at Chicago, Illinois.

Copyright 1956, by The American Congress of Physical Medicine and Rehabilitation.

EDITORIAL BOARD

EARL C. ELKINS, M.D., Rochester, Minn., Chairman
ARTHUR C. JONES, M.D., Portland, Ore.
FREDERIC J. KOTTKE, M.D., Minneapolis
FRED B. MOOR, M.D., Los Angeles
PAUL A. NELSON, M.D., Cleveland
GEORGE M. PIERSOL, M.D., Philadelphia
ARTHUR L. WATKINS, M.D., Boston

CONSULTANTS TO EDITORIAL BOARD

C. KNIGHT ALDRICH, M.D., Chicago
LENOX D. BAKER, M.D., Durham, N.C.
LEO BARTEMEIER, M.D., Baltimore
CYRIL COURVILLE, M.D., Los Angeles
ROBERT C. DARLING, M.D., New York City
OTTO GLASSER, Ph.D., Cleveland
JAMES G. GOLSETH, M.D., Pasadena, Calif.
W. HENRY HOLLINSHEAD, Ph.D., Rochester, Minn.
WILLIAM KUBICEK, Ph.D., Minneapolis
IRVINE McQUARRIE, M.D., Minneapolis

The ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is devoted to the publication of significant articles in this particular field. Contributions of interest to those in physical medicine and rehabilitation are invited. Articles are accepted only with the understanding that they are contributed exclusively to the ARCHIVES. Articles and accompanying illustrations become the property of the journal.

MANUSCRIPTS

Submit only the original copy of the article, but retain a copy for use in correcting galley proofs. Carbon copies are not acceptable for editing and typesetting purposes.

REFERENCES

References should be placed at the end of the manuscript and should conform to the style of the Quarterly Cumulative Index Medicus. No more than twenty references should be included with a manuscript.

ILLUSTRATIONS

Only reproducible illustrations will be accepted. The Editorial Board reserves the right to limit the number and size of illustrations used with any manuscript submitted for publication. The author is responsible for any charges in the preparation of zincs and half-tones from illustrations.

REPRINTS

Reprint order blanks with a schedule of prices will be attached to galley proofs. Individual reprints of an article must be obtained direct from the author.

COPYRIGHT

Matter appearing in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is covered by copyright. Permission for reproduction must be directed to the Editorial Board.

Detailed information covering instructions for the preparation of manuscripts for publication may be had by writing direct to the Editorial Office, 30 N. Michigan Ave., Chicago 2.

Printed in U.S.A.

SEND FOR YOUR CATALOG OF

Rehabilitation Products

Rehabilitation Products offers you the most complete variety of advanced equipment and supplies in the field—plus unequaled distribution and service facilities. So send for your helpful RP Catalog today!

TOMAC

Ultrasonic Generators

For inducing micro-cellular vibration. May be applied directly with mineral oil or under water. Frequency of oscillations remains constant—however, intensity of vibrations through quartz crystal can be varied. Unit is type approved by FCC. Approved by Underwriter Laboratories.

Electromatic Wheel Chair

Power driven, easily operated. Folds to 11½". Ideal for patients unable to propel wheel chairs. Operates and maneuvers with fingertip, foot, or chin controls, at speeds up to 5 MPH. Climbs 7° ramp. Brakes set automatically when power is off.

Porto-Lift

Effortless lifting of patients in prone or seated positions at the touch of simple hydraulic controls. Insures easy, safe, and comfortable movement from bed to wheel chair, automobile, and bath. 600 lbs. lifting capacity. Adjustable base width. One of many patient lifts in the RP Catalog.

Canes

Patients are assured of constant stability with the new "Ankle Action" Tripod Cane (at left). All three feet are kept in contact with the floor at all times by the flexible rubber mount.

Canadian Crutches (at right) Lightweight, but strong aluminum and easy to handle. Adjust from 28½" to 35". Hinged arm band. Also available in lightweight steel, flexible (but not hinged) arm band.

To receive your Rehabilitation Products Catalog, just complete and mail this coupon.

Rehabilitation Products
Division of American Hospital Supply Corporation
Department PMR
2020 Ridge Avenue, Evanston, Illinois

Dear Sirs:
Please send me a copy of the Rehabilitation Products Catalog.

Name_____ Title_____

Organization_____
(Name of hospital, clinic, etc.)

Department_____

Address_____

City and Zone_____ State_____

Now... precise, repeatable, easily obtained results for...

electrodiagnosis and prognosis

of neuromuscular disorders

MODEL CH-3

VARIABLE PULSE GENERATOR and CHRONAXIE METER

new advanced electronic design • performs chronaxie tests • strength duration curves • other electrodiagnostic procedures!

In chronaxie tests, procedures are simplified . . . results are obtained with minimum instrument manipulation, through *automatic current-doubling*. All testing procedures are expedited . . . results are accurate, repeatable, meaningful. The new automatic constant current control circuit eliminates error due to variations in patient and electrode resistance. Also, peak output pulse current is constantly clearly indicated on a large meter to further facilitate electrodiagnosis. *For complete information, write:*

teca corporation

80 Main St. • White Plains, N. Y.

Georgia Warm Springs Foundation

GRADUATE COURSE

Physical Therapy and Occupational Therapy In the Care of Poliomyelitis

This course is open to graduates of approved schools of physical and occupational therapy. Such graduates must be members of the American Physical Therapy Association and/or American Registry of Physical Therapists, or American Occupational Therapy Association.

Entrance Dates: First Monday in January, April and October.

Course I – Emphasis on care of convalescent neuromuscular disease with intensive training in functional anatomy, muscle testing, muscle reeducation and use of supportive and assistive apparatus. This course is complete in itself.

Course II – Three months duration with Course I prerequisite. Emphasis on care of severe chronic physical handicaps with intensive training in resumption of functional activity and use of adaptive apparatus.

In-Service Training Program – Fifteen months duration at salary of $225 per month plus full maintenance, increasing to $250 per month at the completion of nine months. This program includes training in Courses I and II.

Tuition: None. Maintenance is $100 per month. For scholarship to cover transportation and maintenance for Courses I and II, contact National Foundation for Infantile Paralysis, Inc., 120 Broadway, New York 5, New York. (Scholarships require two years of experience.)

For further information contact:

ROBERT L. BENNETT, M.D.

Medical Director

Georgia Warm Springs Foundation

WARM SPRINGS, GEORGIA

PRONATING swing begins at the front of heel approximately at the astragalo-scaphoid joint instead of acting merely as a metatarsal abductor.

Pressure is distributed and applied at three points:

1. Laterally directed pressure over the medial border of the first metatarsal . . . A LEVER.
2. Laterally directed pressure over the medial margin of the os calcis . . . A LEVER.
3. Medially directed pressure directed opposite the calcaneo-cuboid joint . . . A FULCRUM.

An elevation in the sole under the calcaneo-cuboid joint corrects so called "rocker foot".

THE TARSO PRONATOR SHOE SUPPLIED SINGLY. . . IN PAIRS . . . IN SPLIT PAIRS

Write for descriptive folder and nearest dealer

MAURICE J. MARKELL SHOE CO., INC.

332 So. Broadway • Yonkers, N. Y.

To enable you to

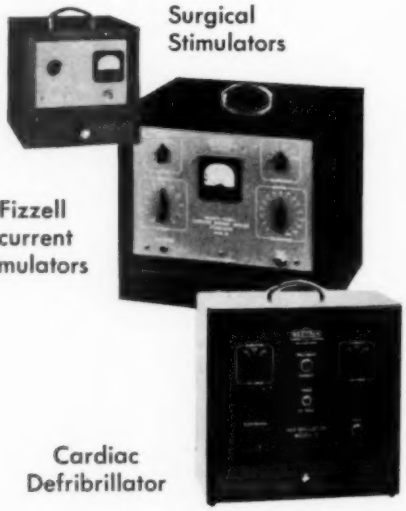
SEE and HEAR

muscle action potentials

The MEDITRON single and dual channel electromyographs provide every desired facility.

Modern Instruments for Electrodiagnosis and Electrotherapy

ACCURACY
DEPENDABILITY
QUALITY



Surgical Stimulators

Golseth-Fizzell constant current impulse stimulators

Cardiac Defribrillator

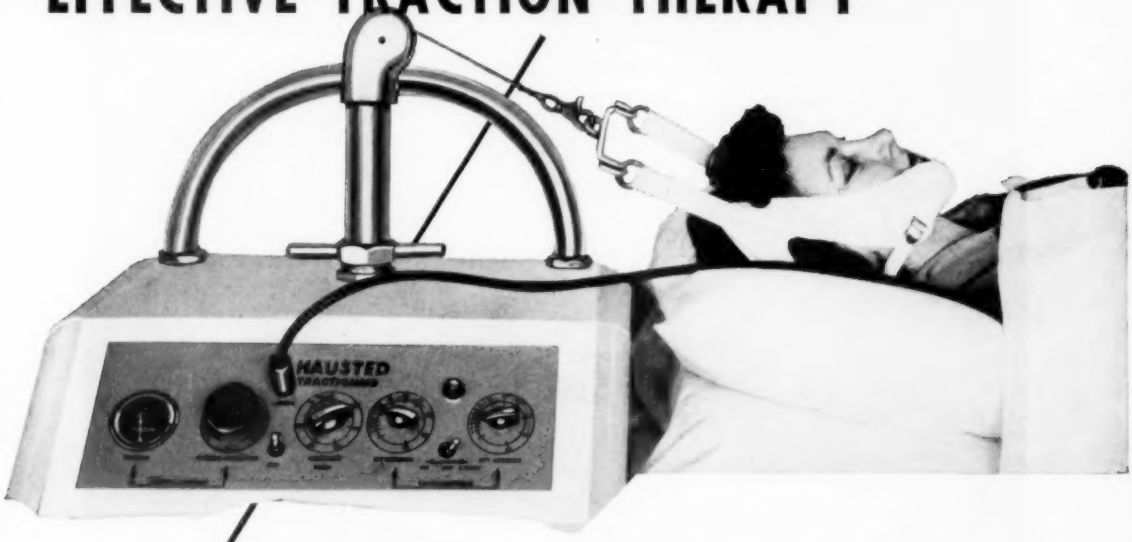
Available soon — instructional films in electromyography. Write today for details.

THE MEDITRON COMPANY

MEDITRON

708 SOUTH FAIR OAKS AVENUE • PASADENA 2, CALIFORNIA

PROVIDE PATIENTS WITH MODERN, EFFECTIVE TRACTION THERAPY



New HAUSTED TRACTIONAID *Compensates for Patient Movement Up to 18 Inches!*

Successfully used in the treatment of:

- LOW BACK DISORDERS
- LUMBO-SACRAL STRAIN
- HERNIATED CERVICAL DISKS
- OSTEO-ARTHRITIS OF CERVICAL SPINE
- MUSCLE SPASMS OF THE NECK
- FIBRATIC CONDITIONS
- MANY CASES OF SCIATICA

And many other conditions requiring steady or intermittent traction.

The Hausted Manufacturing Co. also produces a complete line of Hospital Stretchers and Accessories.

The New HAUSTED TRACTIONAID is the ultimate for steady or intermittent application in either pelvic or cervical traction.

Three years of field testing have proved it trouble-free and dependable. One unit has operated continuously, 24 hours a day, for a full year — without maintenance or servicing!

Traction supervision is practically eliminated because the TRACTIONAID — electronically controlled and hydraulically operated — automatically compensates for as much as eighteen inches of movement on the part of the patient.

Extension arms permit traction from any angle, any position. TRACTIONAID can be used with the patient sitting or prone. Clinical experience shows that many patients can be spared hospitalization when treated as out patients with the Hausted TRACTIONAID.

For detailed information, write The Hausted Manufacturing Co., Medina, Ohio.

HAUSTED MANUFACTURING CO. MEDINA, OHIO

ONLY HAUSTED PROVIDES SUCH A LARGE SELECTION OF USEFUL ACCESSORIES

THE BURDICK

UT-4 Ultrasonic Unit $395

This new addition to the Burdick line fulfills the busy practitioner's need for a compact, high-quality ultrasonic unit at a moderate price.

Weighing only 25 pounds, the Burdick UT-4 Ultrasonic unit has an effective maximum intensity of 2½ watts per sq. cm. and an irradiating surface of 6 sq. cm., with 15 watts total output. Complete unit measures only 9" x 12" x 16".

Its right-angle applicator assures ease and convenience, and the 6-foot flexible cable gives the operator ample freedom of movement. A Receptor switch permits pre-setting intensity before starting treatment.

Built in accordance with the recommendations of the American Standards Association, the UT-4 carries the approval or acceptance of F.C.C., Canadian Dept. Transport and Underwriters' Laboratories.

Ask your Burdick dealer for a demonstration in your office, or write us for information.

THE BURDICK CORPORATION Burdick **MILTON, WISCONSIN**

HYDROCOLLATOR

Steam PACK

MOIST HEAT

Now moist heat can be applied conveniently, effectively and with a minimum investment in equipment. No dripping, no wringing, no repeated applications. Each application gives at least 30 minutes effective moist heat. The Steam Pack is merely heated in water, wrapped in a towel, and applied. Standard equipment in leading hospitals and clinics across the nation.

DESCRIPTIVE MATERIAL ON REQUEST

CHATTANOOGA PHARMACAL CO., INC.

CHATTANOOGA 5, TENNESSEE

MASTER UNITS

Four all stainless steel models to meet the various requirements in hospitals, clinics, physicians' offices, and patients' homes. Automatically maintains Steam Packs in water at proper temperature — constantly ready for immediate use. No plumbing used.

D-3 2 Pack

E-1 4 Pack

SS — 6 Pack

M-2
12 Pack Mobile Unit

HANDI-DRIVE

(ONE LEVER CONTROL)

ENABLES THE HANDICAPPED TO DRIVE WITH SAFETY

Safe and confident driving is now possible for anyone

HANDI-DRIVE

with a Handi-Drive. Requires only one lever to operate. Has 5 times the leverage of an ordinary foot brake. Unlike others, it is mechanically operated by smooth roller bearing rolling on a cam. Approved by State Highway Commissions.

FREE: A postal card will bring you descriptive literature.

LEVERAGE HAND BRAKE CO.

P. O. BOX 853 • FARGO, N. D.

Enjoy a wealth of

INFORMATION

and new ideas . . . all yours

WITHOUT COST!

Write for

FREE CATALOG PM

picturing and describing our new, improved

SURGICAL and ORTHOPEDIC

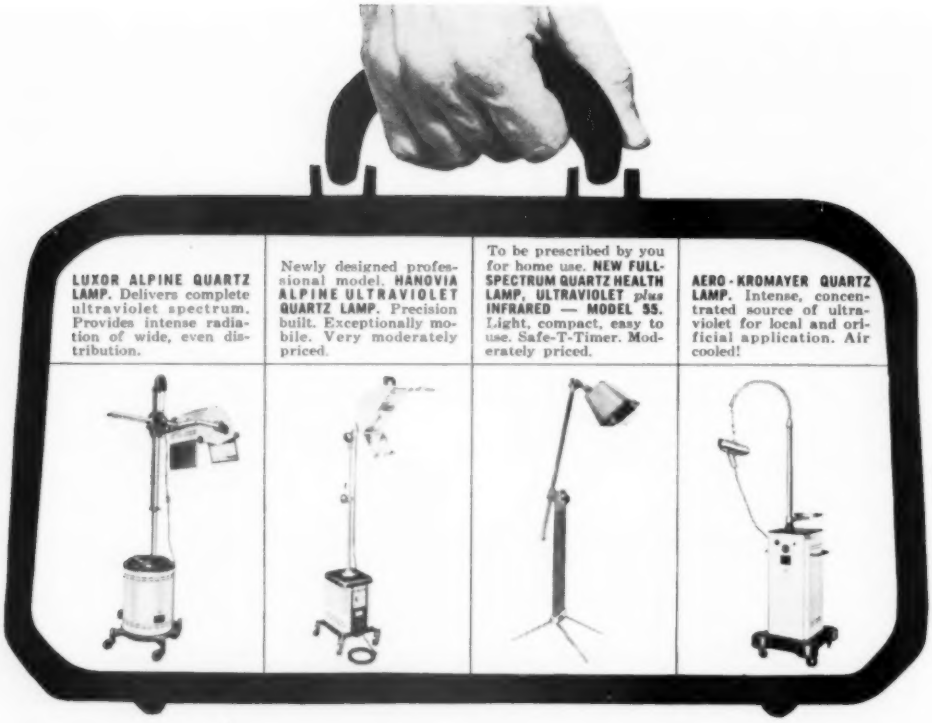
APPLIANCES

for early training and

REHABILITATION

COSMEVO MFG. CO.

218 Paterson St., Paterson 1, N. J.


LUXOR ALPINE QUARTZ LAMP. Delivers complete ultraviolet spectrum. Provides intense radiation of wide, even distribution.
Newly designed professional model. HANOVIA ALPINE ULTRAVIOLET QUARTZ LAMP. Precision built. Exceptionally mobile. Very moderately priced.
To be prescribed by you for home use. NEW FULL-SPECTRUM QUARTZ HEALTH LAMP, ULTRAVIOLET plus INFRARED — MODEL 55. Light, compact, easy to use. Safe-T-Timer. Moderately priced.
AERO-KROMAYER QUARTZ LAMP. Intense, concentrated source of ultraviolet for local and orificial application. Air cooled!

Ultraviolet therapy speeds convalescence!

Recognized ancillary treatment in physical rehabilitation

Essential adjunct in physical medicine, ultraviolet treatment is particularly effective in increasing blood hemoglobin level. Exposure to Hanovia ultraviolet improves absorption and ultilization of calcium, iron, nitrogen and phosphorus.

Authoritative report reads: "The blood changes produced by ultraviolet radiation are increased number of red and white cells and platelets, lowered blood sugar, increased sugar tolerance, increased blood calcium, relative lymphocytosis and eosiniphilia." Other authorities report: "Ultraviolet exerts a glycogen storing effect preventing the lowering of respiratory quotients after muscular exercise."

In addition to your office use of ultraviolet equipment, ease your schedule by prescribing home ultraviolet therapy, yet maintain treatments under your control. New Hanovia Health Lamp Model 55, prescribed by you, may be purchased from surgical supply dealers.

Yours On Request: Valuable authoritative treatise describing ultraviolet in physical rehabilitation. Without obligation, write for your free copy. Dept. PMR-9

World-Leader in Ultraviolet for Over 50 Years

Hanovia scientists and engineers have made major contributions to the vast improvement in physical therapy equipment, keeping pace with modern science and clinical requirements.

HANOVIA CHEMICAL & MFG. CO. GREATEST NAME IN ULTRAVIOLET

ENGELHARD INDUSTRIES

100 Chestnut Street Newark 5, New Jersey

Chicago • Cleveland
Washington, D. C.
Los Angeles • San Francisco

The makers of *Medcolator* proudly introduce the 3-WAY *Medco-sonlator*

OFFERING ELECTRICAL MUSCLE STIMULATION AND ULTRA-SOUND SIMULTANEOUSLY THROUGH A SINGLE* THREE-WAY APPLICATOR

AN IDEAL COMBINATION AS AN ADJUNCT THERAPY

THE VERY POPULAR *Medcolator* FOR ELECTRICAL MUSCLE STIMULATION and . . .

ULTRA-SOUND - - FOR MECHANICAL STIMULATION PRODUCING STRUCTURAL HEATING . . . ALL IN ONE COMPACT UNIT!

The decision to offer electrical muscle stimulation and ultra-sound therapy through a SINGLE applicator, is the not too dissimilar physiological paralleling of applications and indications.

TIMER OPERATES BOTH MEDCOLATOR AND ULTRA-SOUND. TREATMENTS MAY BE GIVEN SIMULTANEOUSLY OR INDIVIDUALLY.

F.C.C. Type Approval No. U-135

Licensed under U. S. Patents to A. T. & T. Company and Western Electric Company for Therapeutic Generators.

Available through your dealer. Write for COMPLETE information.

* An Indifferent Electrode is Required for Electrical Muscle Stimulation.

PATS. PEND.

MEDCO ELECTRONICS COMPANY, INC.
Division — Medco Products Co., Inc.
3607 EAST ADMIRAL PLACE • P. O. BOX 3275-A • TULSA, OKLA.

PRESTON

A Complete Line

FOR PHYSICAL MEDICINE AND REHABILITATION

REHABILITATION:

Walking Parallel Bars and Exercise Staircases of various designs; Posture Mirrors, single and triple; **Gymnasium Mats** in various thicknesses and coverings; **Bicycle Exercisers;** Restorator; **Progressive Resistance Exercise Units;** Quadriceps-Gastrocnemius-Footdrop Boots; Dumbbells; Indian Clubs; **Wall Pulleys;** Door Pulley Assemblies; **Guthrie-Smith Suspension Apparatus;** Stall Bars; **Shoulder Wheels** with height adjustment; Manuflex and Gym Kit; Kanavel Table; **Sayre's Headslings;** Ankle Exercisers; Large selection of **Treatment Tables;** Timers.

INVALID EQUIPMENT:

Everest & Jennings Wheelchairs; Hollywood Wheelchairs; Commodes; **Walkers;** Patient Lifters; **Standing (Tilt) Tables;** Self-propelled wheelstretchers; Large selection of **Crutches,** hardwood and aluminum; **Canadian Crutches; Tripod** and **Four-legged Canes.**

HYDROTHERAPY—ELECTROTHERAPY:

Whirlpools for every use; Hubbard Tanks; **Paraffin Baths; Hydrocollator Master Units** and **Steam Packs; Ries "Moistaire";** Shortwave Diathermy — Consoles and Portables; Galvanic-faradic-sinusoidal Generators; Ultraviolet Lamps; **Infra-red Lamps and Bakers; Ultrasonic Generators.**

CEREBRAL PALSY EQUIPMENT:

Wide variety of **Stand-in Tables,** Cut-out Tables; **Kindergarten Chairs,** Relaxation Chairs; **Standing Stabilizers;** Crab Crutches; Skis; Crawler; **Protective Helmets** (Headguards); Tricycles.

SELF-HELP DEVICES:

For Activities of Daily Living: **Toilet and Bathing Aids;** Automatic Page Turner; Reachers; Eating Utensils and **other A D L Equipment.**

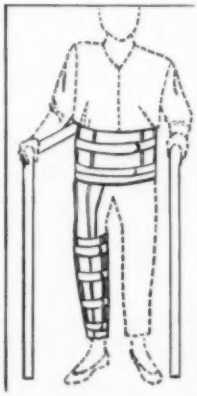
DIAGNOSTIC APPARATUS:

Chronaximeters; **Dynamometers;** Newman Myometer; **Goniometers;** Oscillometers; Thermocouples and Skin Thermometers.

New Item of Interest

THE NEW KEYSTONE SPLINT

Useful in ambulation training of patients, particularly hemiplegics and paraplegics. Also used in determining brace requirements and for immobilization of fractures. Made of washable preshrunk materials; has hardwood stays for knee and/or hip stabilizations, and 6 straps which can be placed in various positions.



Write for Illustrated Literature

Catalog #PC 4395 — Price complete with carrying case $33.50.

With our large stock of equipment you are always assured of prompt delivery.

Write for Your Free Copy of our Illustrated Catalog #1056 and for any additional information.

ALL your needs supplied by ONE reliable source.

J. A. PRESTON CORP.
175 FIFTH AVENUE, NEW YORK 10, N. Y.

Effect of Ischemia and Curare on Spasticity

Dorothy M. Stillwell, M.D.
Canada
and
Jerome W. Gersten, M.D.
Denver

During the past few years, attempts have been made to quantitate the resistance offered by a spastic extremity to passive motion.[1-3] With these measuring technics, mild decreases in spasticity were found with infrared radiation and hot packs, and moderate decreases with intravenous mephenesin (Myanesin) and ultrasound to the nerve roots, at an intensity of 1.90 watts per square centimeter. Because of the only moderate decrease in spasticity — averaging 17 per cent in the best of these procedures — and the relatively short duration of effect, the search for more effective relaxing agents in the treatment of spasticity was continued. In this study an attempt was made to evaluate ischemia and curare, as far as effects on spasticity were concerned.

Gilliat[4] initially performed clinical studies with ischemia in order to determine its effect on the flexor plantar response, hoping that ischemia might be used as a diagnostic aid in early pyramidal lesions with equivocal plantar responses. Later[5] he investigated the effects of local circulatory arrest in spastic hemiplegics and paraplegics. He reported a diminution in hypertonus lasting for some time after the release of the circulation. This decrease in spasticity outlasted any increase in muscle weakness caused by the procedure.

Recently sublingual d-tubocurarine has been used in an effort to relax the spastic state. Erdei[6] was the first to use this preparation. He used tablets containing 2 mg. of d-tubocurarine chloride pentahydrate which were dissolved sublingually in 3 to 10 minutes. His maximum dose was 12 mg. He noted, in chronic neurological states such as hemiplegia, that the spasticity was considerably reduced. Neff and Mayer[7] stated that they also obtained reduction of spasticity in hemiplegia with sublingual curare. The pellets used in their study contained 3 mg. of d-tubocurarine; the maximum dosage used was 12 mg.

Because of this suggestive work with ischemia and sublingual d-tubocurarine it was decided to evaluate these two procedures further with more quantitative measuring technics.

Method

The static force balance, described in detail elsewhere,[8] was used to measure spasticity objectively. In the previous study the validity and reliability of the technic are discussed. The technic used for examination of the upper extremity was similar to that used previously.[8] Briefly, this required that the extremity to be tested be fixed securely to a board mounted on ball bearing casters. The force required to move the extremity across the test board was then measured. When a lower extremity was under examination the principle was the same, but there was some difference in detail. The patient was placed on a plinth, which was covered with a sponge rubber mattress. The test board used in this case (*B*, fig. 1) was 77.0 by 45.5 cm. with sturdy supporting legs 15.3 by 4.5 cm. by 4.5 cm. The edge of the board placed next to the patient was padded with ½ inch sponge rubber. For studies involving hip motion a long leg board 68.5 by 15 cm. was used. This board was mounted on four ¾ inch ball bearing casters and padded, on the upper surface, with ½ inch sponge rubber. In the case of knee movement a shorter board 34 by 10 cm. was used (*C*, fig. 1). This, too, was padded with sponge rubber and mounted on ball bearing casters. The static force balance was clamped to the test board (*A*, fig. 1).

From the Department of Physical Medicine and Rehabilitation, University of Colorado, School of Medicine, Denver. This study was supported by a Grant-in-Aid from the University of Colorado.

Assistant Medical Director, Western Society for Rehabilitation, Rehabilitation Centre, Vancouver.

Associate Professor, Physical Medicine and Rehabilitation, University of Colorado, School of Medicine.

Abridgment of a thesis submitted by Dr. Stillwell to the Faculty of the Graduate School, University of Colorado, in partial fulfillment of the requirements for the degree of Master of Science in Physical Medicine and Rehabilitation.

Fig. 1 — Static force balance position to test the resistance of the leg to extension. A is the static force balance, B is the test board, and C is the leg board.

Prior to each test care was taken to see that the test board was level.

The patient was made comfortable on the plinth either on his back or side depending on the motion to be studied. The nontest leg was securely fixed in place with a 124 by 10 cm. heavy webbing strap. The skin was protected with a sponge rubber pad. The test board was then put in place, the padded end as close to the patient as possible. After the force balance was clamped to it, the board was levelled. The test leg was then strapped to the movable leg board by two mole skin lined straps (47 x 5 cm. and 66 x 5 cm.). When necessary a patellar pad was used as well. When motion around the knee was studied the proximal end of the leg board was placed beneath the axis of the joint. Since this was not possible in studies around the hip, the leg board was placed as high as possible and in nearly the same position on the patient each time it was used. With the patient lying on his side the angles of hip flexion and knee flexion were maintained constant for each patient in successive tests, although these angles varied slightly from patient to patient. When the patient was lying on his back the degree of hip adduction had to be kept constant. The static force balance was positioned so that the contact arm was at a 90 degree angle to the leg board, while the distance from the point of contact to the joint in question was constant for each patient.

A pressure high enough to produce ischemia was applied as proximally as possible on the extremity being studied. A Baumanometer and cuff were attached to a reservoir bottle in order to insure a rapid increase of pressure in the cuff and thus eliminate venous stasis. The pressure used was 200 mm. Hg, maintained for 10, 15, and 20 minutes. During the ischemic period the limb was kept in the test position. Readings of the force required to initiate motion of the extremity were taken before ischemia was produced, immediately after the release of the pressure, and at 5-minute intervals thereafter for 25 to 35 minutes depending on the tolerance of the patient. Three patients with spastic elbow flexors (two hemiplegics and one patient with surgically removed cervical cord tumor) and two with spastic knee flexors (traumatic paraplegics) were observed.

The other aspect of this study was concerned with the effects of sublingual pellets of d-tubocurarine chloride (Cug-

ilex*). Each pellet contained 3 mg. of the drug. Two pellets, (6 mg.), were given as an initial dose, and another two pellets were given 10 minutes later. The maximum dose, then, was 12 mg. and the mode of administration was identical with that used by Neff and Mayer.[7] While the pellets were dissolving the patient was not allowed to talk. In case of any untoward side effects a Monaghan respirator was kept in the test room, although at no time was the patient aware of the reason for its presence. Control readings were taken before the administration of the drug, and then at 5-minute intervals for 30 to 35 minutes after the initial dose of the drug. Again the same three patients with spastic upper extremities were studied; in addition, the spastic knee flexors in one traumatic paraplegic were observed.

Results

A total of 145 observations was made on five patients treated with ischemia for 10 minutes. There was a sustained and significant decrease in spasticity, with the maximum change averaging 17.8 per cent, immediately after ischemia was terminated. Thirty minutes after stopping ischemia, however, there was still a 13 per cent decrease in spasticity.

A total of 169 observations was made on the same patients treated with ischemia for 15 minutes. Again a sustained and significant decrease in spasticity was noted, with the maximal change, a decrease of 24 per cent, occurring 5 minutes after the pressure was released. Thirty minutes after stopping ischemia a 16 per cent decrease in spasticity was still present.

A total of 185 observations was made on these patients treated with ischemia for 20 minutes. Changes in spasticity were greater than with the shorter periods of ischemia, and there was a sustained and significant average decrease in spasticity, which reached a maximum of 29 per cent 20 minutes after the ischemic period. After this time a steady return toward the control baseline occurred although an 18 per cent decrease in spasticity was still present 30 minutes after and a 13 per cent decrease in spasticity 35 minutes after the ischemic period (fig. 2). No ill effects of any kind, which could be attributed to the ischemia, were noted.

There were no side effects during the sublingual administration of d-tubocu-

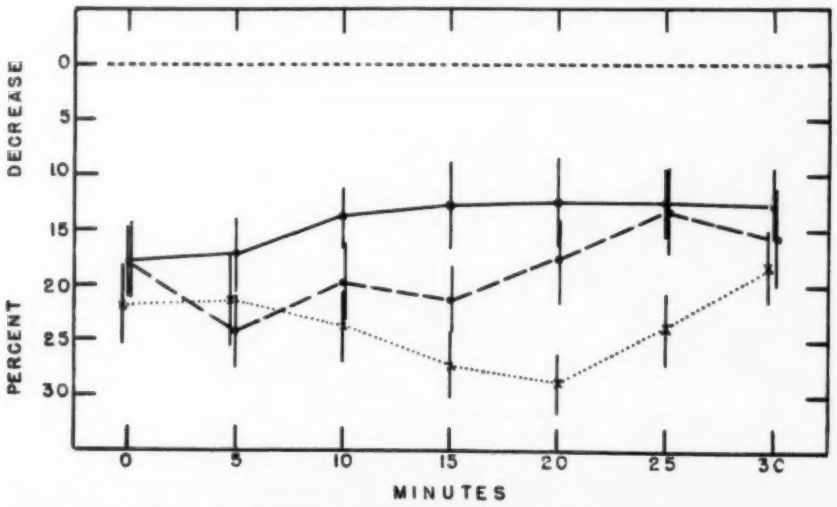


Fig. 2 — Effect of ischemia on the force required to initiate motion of the spastic extremity. The abscissa represents the time after release of pressure, the ordinate the change from pretreatment values. The solid line (•) represents ischemia for 10 minutes, the broken line (o) ischemia for 15 minutes, and the dotted line (x) ischemia for 20 minutes. The vertical lines represent one standard error from the mean per cent change.

rarine. One hundred fifty observations were made on four patients; the three patients with spastic upper extremities and one patient with a spastic lower extremity were studied. In considering the average results observed in the four patients there was no significant change in the spastic state and no uniform pattern of reaction. When a decrease did occur it was never as extensive as that seen in the same patients treated with ultrasound or ischemia.

Discussion

Ischemia has thus far proved to produce greater decreases in spasticity — at least when measured with technics of the type used in this study — than any other therapeutic approach attempted. Its effectiveness in decreasing spasticity may be due either to anoxia or pressure. This problem has been investigated by Bentley and Schlapp,[8, 9] who studied the influence of blood supply on conduction in the external popliteal nerve in normal cats. From their observations they felt that if nerves are to function there must be a blood supply either directly to the nerve or indirectly to the surrounding tissues. From tourniquet experiments they concluded that "it does not appear likely that tourniquet ischemia introduces any other factor than anoxemia."[8] Further observations with a pneumatic cuff lead these authors to feel "that this nerve block is not due to direct pressure."[8] In experiments with direct pressure these authors found that, in contrast to ischemia, it took much longer to establish block and there was an absence of recovery following the release of pressure. From their work they concluded that when pressure per se produced nerve block it was due to mechanical injury of the nerve and not to anoxia.[9] Lewis, Pickering, and Rothschild[10] also showed that disturbances observed in the human limb during and after production of ischemia were due to blood loss to the nerve rather than to pressure itself. In the light of this evidence it is felt, therefore, that anoxia, and not pressure, is the more probable mechanism for the decrease in spasticity observed.

It was found that the longer the pressure was exerted the greater was the decrease in spasticity (fig. 3). This could be explained on the basis of relative degrees of anoxia, the anoxia being more severe with the longer application of the pressure. This relationship between duration of ischemia and degree of decrease in spasticity is paralleled by other experi-

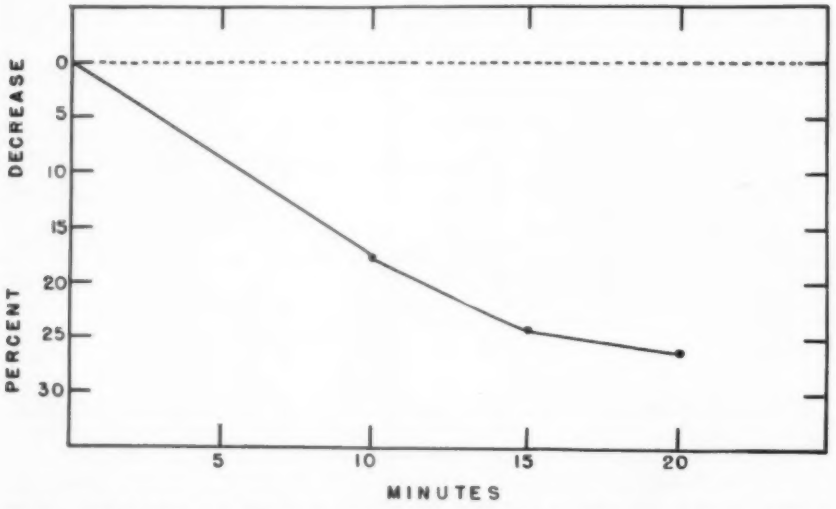


Fig. 3 — Effect of duration of ischemia on the decrease in spasticity. The abscissa represents the duration of ischemia, the ordinate the maximum per cent decrease in the amount of force required to initiate movement of the spastic extremity.

mental observations. Lewis and his coworkers[10] found that, with ischemia, muscle paralysis in the upper arm progressed in a centripetal fashion. Also, Bentley and Schlapp[8] found that the longer the period of ischemia the slower and less complete was the recovery.

The results with sublingual d-tubocurarine were not impressive. The maximum dose used was 12 mg. given in two doses of 6 mg. each 10 minutes apart. This technic does not vary from that used by Neff and Mayer,[7] and the maximum dose is the same as that used by Erdei.[6] The dosage used was not sufficient to give significant results. Further work may be necessary before any conclusions can be reached as to the effectiveness of this drug in combatting spasticity.

From the clinical standpoint it would appear worthwhile to evaluate ischemia further. Since, during our evaluation of these agents, the patient remained completely passive, it is not known what would happen to the degree of spasticity if the patient were required to undergo a treatment of muscle reeducation following the ischemia. If the spasticity remained decreased, as in our observations, then ischemia might be of value in the treatment of the hemiplegic and paraplegic patient. Preliminary studies with paraplegics in this laboratory seem to show that the ischemic technic may be of value in gait training; however, this must be examined in a larger series of patients and for a longer period of time before definite statements can be made.

Summary

An objective study was made to determine the effects of two therapeutic procedures on spasticity. These procedures were ischemia produced by a pressure of 200 mm. Hg for 10, 15, and 20 minutes, and sublingual d-tubocurarine. Ischemia produced a sustained and significant decrease in spasticity. This decrease was related to the duration of ischemia. Sublingual d-tubocurarine, at a maximum dose of 12 mg., resulted in no significant change in the spastic state.

*The donation of a generous supply of d-tubocurarine, in pellet form, by Cugil Laboratories Inc., Palo Alto, Calif., is gratefully acknowledged.

References

1. La Joie, W. J., and Gersten, J. W.: An Objective Method of Evaluating Muscle Tightness. Arch. Phys. Med. & Rehab. **33**:595 (Oct.) 1952.
2. Stillwell, D. M., and Gersten, J. W.: The Effect of Ultrasound on Spasticity, Proc. Fourth Annual Conference on Ultrasonic Therapy, Alhambra, Calif., Cunningham Press, 124-131, 1955.
3. Newman, L. B.; Arieff, A. J., and Wasserman, R. R.: Present Status in the Management of Spasticity and Spasm: Preliminary Report. Arch. Phys. Med. & Rehab. **35**:427 (July) 1954.
4. Gilliatt, R. W.: The Extensor Plantar Response After Ischaemia of the Leg. J. Physiol. **118**:42P (Oct. 28) 1952.
5. Gilliatt, R. W.: The Effect of Peripheral Nerve Ischaemia on Post-hemiplegic Disorders of Movement. J. Physiol. **123**:43P (Feb. 26) 1954.
6. Erdei, A.: Sublingual d-Tubocurarine for Muscular Spasm (letter to the editor). Lancet **1**:1070 (May 24) 1952.
7. Neff, W. B., and Mayer, H.: The Sublingual Administration of Curare. California Med. **79**:227 (Sept.) 1953.
8. Bentley, F. H., and Schlapp, W.: Experiments on the Blood Supply of Nerves. J. Physiol. **102**:62 (June 30) 1943.
9. Bentley, F. H., and Schlapp, W.: The Effects of Pressure on Conduction in Peripheral Nerve. J. Physiol. **102**:72 (June 30) 1943.
10. Lewis, T.; Pickering, G. W., and Rothschild, P.: Centripetal Paralysis Arising Out of Arrested Blood Flow to the Limb, Including Notes on a Form of Tingling. Heart **16**:1 (Oct.) 1931.

The Influence of Syncardial Massage on the Peripheral Circulation

Khalil G. Wakim, M.D., Ph.D.,
Section of Physiology,
Justus F. K. Lehmann, M.D.,
Fellow in Physical Medicine,
Newton C. Birkhead, M.D.,
Fellow in Medicine,
Frank H. Krusen, M.D.,
Section of Physical Medicine and Rehabilitation,
and
Edgar V. Allen, M.D.,
Section of Medicine,
Mayo Clinic and Mayo Foundation,*
Rochester, Minn.

The "syncardon" is an apparatus devised by Fuchs for increasing the circulation in extremities in which the blood supply has become impaired. The principle underlying the effectiveness of the syncardon in peripheral vascular conditions is based on the assumption that when a cuff placed around an extremity is inflated at the moment when the pulse wave passes beneath the cuff the applied pressure aids the elastic elements of the artery in their contraction. It is further assumed that the output of the artery and, consequently, the flow of blood through the limb is increased by this procedure.[1-5] The R wave of the electrocardiogram triggers in unison with the pulse wave mechanism that releases the pressure to the cuff. The time that elapses between the occurrence of the R wave and the arrival of the pulse wave beneath the cuff is measured. Then the time delay is set in such a manner that the period between the appearance of the R wave and the inflation of the cuff is 33 per cent longer than the measured time interval.[2] This is done to make sure that the pulse wave has reached the part of the artery that lies beneath the distal end of the pressure cuff when the latter is inflated. In addition, a duration of the pressure pulses of 0.2 second, a pressure of approximately 50 mm. Hg, and a duration of a daily treatment of 10 to 30 minutes are recommended for therapeutic purposes.[3, 6-11] However, no experimental evidence has been presented to indicate that this apparatus increases the blood flow in the treated extremity. No data on measurements of the blood flow in healthy subjects during and after application of this new device could be found in the literature. Attempt has been made to obtain indirect evidence of the efficiency of the apparatus by measurement of other phenomena such as skin temperatures and oscillograms in patients. Such data do not provide conclusive evidence for the effectiveness of the machine. Clinical studies have been performed by others in patients with peripheral vascular diseases of various origins, such as arteriosclerosis obliterans, Buerger's disease, and Raynaud's disease.[4, 7-10] Improvement of the clinical conditions has been reported without presentation and statistical evaluation of the data. No controls were mentioned.

The purpose of the present investigation was to determine whether the syncardon increases the peripheral blood flow through an extremity if all the recommended procedures are carefully applied. The blood flow through the legs was measured by means of the compensating plethysmograph[12] in healthy persons and in patients with impairment of the circulation to the lower extremity. Readings were obtained before, during, and after treatment of one extremity with the syncardon. The skin temperature of the great toe and the pulse amplitude of the second toe were recorded before, during, and after treatment with the syncardon. Similar measurements were obtained simultaneously from the other leg, which was not treated. These measurements on the untreated extremity and the readings before treatment were used as controls. The duration of treatment with the syncardon was 30 minutes.

*The Mayo Foundation, Rochester, Minn., is a part of the Graduate School of the University of Minnesota.

The conditions of the treatment were the same as those recommended for therapy. The cuff was wrapped around the thigh above the knee and the pressure within the cuff was raised to 50 mm. Hg and was maintained at this level for 0.2 second. The time delay was the measured interval of time between the R wave of the electrocardiogram and the arrival of the pulse wave at the cuff plus 33 per cent of the obtained value. This value was carefully checked every 10 minutes.

As is apparent from the data in table 1, no statistically significant change in blood flow or in amplitude of the toe pulse was observed during or after syncardial massage treatment of healthy extremities with the syncardon.

In order to avoid the possibility that these conditions were not optimal for treatment, the amount of pressure, the duration of pressure, and the time delay were varied over almost the full range available for the apparatus. Five healthy persons were treated in the manner described for a period of 10 minutes for each set of conditions. Recordings were taken during treatment. Observations immediately before and after treatment served as controls. The readings obtained in the contralateral untreated leg were used for comparison with those of the treated leg in order to detect any changes that might result from causes other than the treatment itself. No set of the recommended conditions could be found that had any statistically significant effect on the circulation to the treated extremity.

After no significant change in the peripheral circulation to the lower extremities was obtained in normal individuals during and after treatment with syncardial massage by use of the syncardon, we thought that conditions might be more appropriate if the effects of the syncardon were studied on patients with impairment of the peripheral circulation for whom such an apparatus was specifically devised. Therefore, the same procedure of syncardial massage was tried on the extremities of patients with circulatory insufficiency.

Four patients (three males and one female) with moderately advanced arteriosclerosis obliterans of the lower ex-

Table 1: Influence of Syncardial Massage (30 Minutes) on the Blood Flow and Pulse Amplitude in the Treated Extremities (Left Legs) of Normal Subjects.

Subject		Treated Extremity*			
		Before	After	Change	% Change
1	Flow	2.1	1.9	−0.2 cc.	−10
	Pulse amplitude	4	2	−2 mm.	
2	Flow	1.4	1.4	0 cc.	0
	Pulse amplitude	17	3	−14 mm.	
3	Flow	2.9	3.3	+0.4 cc.	+14
	Pulse amplitude	—	—	—	
4	Flow	2.4	2.4	0	0
	Pulse amplitude	6	6	0	
5	Flow	1.8	1.4	−0.4 cc.	−22
	Pulse amplitude	5	6	+1 mm.	
6	Flow	1.9	1.4	−0.5 cc.	−26
	Pulse amplitude	2	2	0	
7	Flow	1.5	1.6	+0.1 cc.	+7
	Pulse amplitude	7	5	−2 mm.	
8	Flow	2.2	1.3	−0.9 cc.	−41
	Pulse amplitude	16	12	−4 mm.	
9	Flow	1.3	1.5	+0.2 cc.	+15
	Pulse amplitude	5	6	+1 mm.	
10	Flow	1.4	1.6	+0.2 cc.	+14
	Pulse amplitude	1	1	0	
11	Flow	1.8	1.2	−0.6 cc.	−33
	Pulse amplitude	3	1	−2 mm.	

*Blood flow is given in cubic centimeters per minute per 100 cc. of tissue, and pulse amplitude is given in millimeters.

tremities were selected. After establishing controls for blood flow plethysmographically and for skin temperature potentiometrically for both lower extremities of each patient, syncardial massage was given to one of the diseased extremities for 20 minutes according to the recommended specifications previously described. In table 2, the data on blood flow and skin temperature in each case before and after syncardial massage for 20 minutes are presented. In case 1, after syncardial massage, blood flow was reduced 25 per cent and skin temperature reduced 2.2 C. in the treated extremity. In case 2, blood flow was reduced 19.2 per cent and skin temperature increased 0.1 C. in the treated extremity. In cases 3 and 4, two sessions of syncardial massage of 20 minutes each were given with a 10-minute rest period between treatments. In case 3, the blood flow increased 8 per cent and 7.4 per cent and the skin temperature rose 0.7 and 0.1 C. respectively after each treatment. In case 4, blood flow was reduced 21.1 per cent and skin temperature reduced 0.4 C. in the treated extremity after the first syncardial massage. The second treatment in case 4 gave a rise of 6.6 per cent in blood flow and a reduction of 0.6 C. in skin temperature. The blood flow and the skin temperature in the untreated extremity were not significantly altered.

Table 2: Influence of Syncardial Massage (20 Minutes) on Blood Flow and Skin Temperature of Treated Extremities of Patients.

Case		Treated Extremity*			
		Before	After	Change	% Change
1	Flow	2.0	1.5	−.5 cc.	−25.0
	Temperature	30.0	27.8	−2.2° C.	
2	Flow	2.6	2.1	−.5 cc.	−19.2
	Temperature	28.8	28.9	+.1° C.	
3a	Flow	2.5	2.7	+.2 cc.	+8.0
	Temperature	29.6	30.3	+.7° C.	
3b	Flow	2.7	2.9	+.2 cc.	+7.4
	Temperature	30.3	30.4	+.1° C.	
4a	Flow	1.9	1.5	−.4 cc.	−21.1
	Temperature	29.9	29.5	−.4° C.	
4b	Flow	1.5	1.6	+.1 cc.	+6.6
	Temperature	29.5	28.9	−.6° C.	

*Blood flow is given in cubic centimeters per minute per 100 cc. of tissue, and temperature is given in degrees centigrade.

Careful analysis of the findings indicates that syncardial massage did not have a significantly favorable effect on the blood flow, the skin temperature, or the pulse amplitude of the treated extremity. Belcher and Wand-Tetley[13] employed the syncardial apparatus of Fuchs on two patients with obliterative arterial disease. In assessing the effects of syncardial massage on the peripheral circulation, they used radioactive sodium (Na^{24}) to measure the peripheral blood flow. They concluded that syncardial massage did not increase the clearance of radioactive sodium and therefore did not increase the blood flow in the treated extremities. It appears, therefore, that some explanation other than improved arterial circulation is necessary to account for the improvement noted by Fuchs and by Lyons and his associates[14] in ischemic extremities.

Conclusions

In normal subjects, no significant change in the peripheral blood flow or pulse amplitude could be obtained by treatment with the syncardon according to the specified recommendations for use of the apparatus. Similarly applied syncardial massage to extremities with insufficient circulation did not produce significantly favorable effects on either blood flow or skin temperature.

Acknowledgment: The authors are grateful to Gordon K. Branes and Robert Arns for their technical assistance.

References

1. Fuchs, M.: Zur Wirkung der syncardialen Massage bei peripheren Durchblutungsstörungen. Verhandl. deutsch. Gesllsch. Kreislauff. **15**:229 (April) 1949.
2. Fuchs, M.: Neue Methode zur Förderung der lokalen Blutzirkulation: Synkardiale Massage. Schweiz. med. Wchnschr. **75**:542 (June) 1945.
3. Fuchs, M.: Das Prinzip der synkardialen Massage und seine Anwendung. Schweiz. med. Wchnschr. **75**:971 (Nov. 3) 1945.
4. Fuchs. M.: Die synkardiale Massage als Methode zur Verbesserung der Blutzirkulation. Helvet. med. acta **15**:386 (Nov.) 1948.
5. Fuchs, M.: Die Wirkung der synkardialen Massage bei Zirkulationsstörungen der Extremitäten. Dermatologica **94**:137, 1947.
6. Obrist, W.: Oscillographische Untersuchungen über die Wirkungsweise der synkardialen Massage. Cardiologia **19**:34, 1951.
7. Holle, F.: Die syncardiale Massage in der Chirurgie. Arztl. Wchnschr. **5**:926 (Nov. 24) 1950.
8. Obrist, W., and Pulver, W.: Klinische Erfahrungen mit synkardialer Massage bei peripheren Durchblutungsstörungen. Therapeutische Umschau. **7**:3 (April) 1950.
9. Allgöwer, M.: Erfahrungen mit der synkardialen Massage. Ztschr. Unfallmed. **50**:313, 1950.
10. Meister, T.: Behandlungsergebnisse der syncardialen Massage bei peripheren Zirkulationsstörungen. Schweiz. med. Wchnschr. **79**:61 (Jan. 22) 1949.
11. [Fuchs, M.]: Syncardon [according to Dr. Maurice Fuchs] for the Treatment of Peripheral Vascular Disorders. Catalogue 568, Basle, Switzerland, Jaquet Ltd.
12. Berry, M. R.; Baldes, E. J.; Essex, H. E., and Wakim, K. G.: A Compensating Plethysmokymograph for Measuring Blood Flow in Human Extremities. J. Lab. & Clin. Med. **33**:101 (Jan.) 1948.
13. Belcher, E. H., and Wand-Tetley, J. I.: A Critical Evaluation of Syncardial Massage. Ann. Phys. Med. **2**:207 (April) 1955.
14. Lyons, J. F.; Meadows, B., and Fuchs, M.: A New Method for the Treatment of Peripheral Vascular Disease. South. M. J. **48**:811 (Aug.) 1955.

CP Institute

An Institute on Cerebral Palsy will be held on Saturday, October 20, 1956 in the Walnut Room of the Berkshire Hotel, Reading, Pennsylvania, between the hours of 3:00 to 5:00 and 7:00 to 9:00 p.m.

Dr. Temple Fay will conduct the Institute, and will discuss the classification and early recognition of cerebral palsy, his neurophysiologic concept, and reflex and neuromuscular therapy. Patients from the local Cerebral Palsy Treatment Center will be presented for discussion, and Dr. Fay's film on the evolutionary development of primitive patterns will be shown.

The Institute is sponsored by the Reading Chapter of the American Business Club's Cerebral Palsy Treatment Center, Berks County Medical Society, Pennsylvania Academy of Physical Medicine and Rehabilitation, Pennsylvania Chapter of the American Physical Therapy Association, Pennsylvania Society for Crippled Children and Adults, and Pennsylvania Chapter of United Cerebral Palsy.

Physicians and therapists are invited to register in advance by communicating with Herman L. Rudolph, M.D., 400 North Fifth Street, Reading, Pennsylvania. There will be no registration fee.

Role of the Federal Government in Vocational Rehabilitation

Mary E. Switzer
Washington, D. C.

The rehabilitation of the worker "injured in industry" has been a concern of the public vocational rehabilitation program since its beginning in 1920. The original law specifically stated as its major purpose the retraining of "civilians injured in industry and otherwise." Each subsequent piece of legislation extending and enlarging the program has recognized the importance of close cooperation with the state workmen's compensation agencies and has provided for it in the law. Such a provision was in the Barden-LaFollette Act of 1943, which broadened the public program to include medical services, and, in even stronger terms, is in the current Vocational Rehabilitation Act of 1954, Public Law 565.

In the early stages of compensation programs, the emphasis was on money payments to compensate for loss of income, with medical services to restore the function or alleviate the condition caused by the injury. The first vocational rehabilitation concept in workmen's compensation appeared in 1918 when Massachusetts adopted a provision to establish a "division for the training and instruction of persons whose capacity to earn a living has in any way been destroyed or impaired through industrial accident." In the following year, similar provisions were adopted by Oregon, California, and North Dakota. If the present concept of total rehabilitation had existed 25 years ago, the story of the administration of workmen's compensation programs nationally might be quite different.

Fortunately, the developing community teamwork approach — the total approach toward rehabilitation—is having its impact on workmen's compensation programs. As of 1954, 21 states or territories had workmen's compensation laws that contained special provisions dealing with rehabilitation. In most of the state acts involved, the rehabilitation provisions pertain to special maintenance and other benefits to facilitate the vocational rehabilitation of the worker.

Four states and one territory — Ohio, Oregon, Rhode Island, Washington, and Puerto Rico — operate rehabilitation facilities directly under the workmen's compensation law. In Minnesota, Missouri, and several other states, a special bureau or board is established to study rehabilitation problems and to advise injured workers of available rehabilitation facilities if it is felt that rehabilitation will help them.

No little credit for the progress that has been made in fostering community teamwork and in bringing the rehabilitation concept to bear upon workmen's compensation programs must go to such diverse interests as the Welfare and Retirement Fund of the United Mine Workers of America, the Liberty Mutual Insurance Company, the subcommittee on Industrial Relations of the American College of Surgeons, and to various rehabilitation centers.

One basic fact about the rehabilitation of the injured worker needs to be clearly understood: The problem of providing rehabilitation service is community-wide; therefore, the rehabilitation of the worker injured in industry will, with few exceptions, be no better than the services the community can provide. This has been learned from experience in the federal-state program of vocational rehabilitation, where both injured workmen, as well as those disabled by nonindustrial causes, are served and restored by the thousands each year. Part of the task of this program has been to aid and encourage the development of these community resources, for with about 65 million men and women employed today in our labor force, the size of the problem in re-

Part of the **Symposium on Rehabilitation of the Injured Worker** presented at the Thirty-third Annual Session of the American Congress of Physical Medicine and Rehabilitation, Detroit, August 30, 1955.

Director, Office of Vocational Rehabilitation, Department of Health, Education and Welfare.

habilitation has required a broadscale approach to the provision of services.

This same consideration — the immense size of the problem — has been a mounting concern of national, state, and professional authorities in recent years. Today, an estimated 2 million Americans need vocational rehabilitation services of one type or another. This figure does not include hundreds of thousands who are disabled but who are either ineligible for vocational rehabilitation services or are unlikely to benefit from them.

Each year, an estimated 250,000 persons disabled by disease, accidents, or congenital conditions need vocational rehabilitation. Among these are many of the workers who suffered accidents on the job during 1953, with an estimated loss of 45 million production man-days, and a cost of $1.5 billion in lost wages, medical expenses, compensation benefits, and other administrative expenses. Yet, during recent years, the state-federal program has rehabilitated an average of about 60,000 persons annually. Even if persons rehabilitated through private channels are included, the gap between those who need help and those who are getting it remains a large one. Considerable progress toward closing that gap could be made if more workmen's compensation cases were referred promptly to state vocational rehabilitation agencies. At the present time, no more than 9 per cent of those rehabilitated annually are persons who are injured on the job.

The economic argument for referral of workmen's compensation cases is clear-cut, but no more so than the argument for the referral of all patients who need the service. It is certainly in the public interest to restore the injured workman, to take the disabled from public assistance rolls and return them to activity and employment, to enable the disabled young adult who has never worked to enter the labor force and become self-sustaining. These and all the others who make up the sinews of American society have an interest in and a right to service from the public program of vocational rehabilitation. Experience has shown the economic soundness of such an approach.

Of the persons rehabilitated through the public program in 1954, 20 per cent were receiving public assistance at the time they applied for rehabilitation services, with the payments to them for maintenance totalling about $8 million a year. With completion of rehabilitation, these individuals became taxpayers instead of tax consumers. They and the others restored during 1954 are now paying federal income taxes at an estimated rate of $8 million dollars annually. They increased their combined annual earnings from an estimated $15 million to an annual rate of $102 million after rehabilitation. The Nation gained an additional 86 million man-hours of productive effort per year because of their rehabilitation.

Vocational rehabilitation *does* make economic sense — economic sense from the standpoint of those injured on the job as well as of those whose handicaps are of other origins. For such economic reasons, all responsible citizens have an interest and an obligation to help close the gap between need and available services in rehabilitation. For a variety of other sound and humane reasons, we need to bring our resources more nearly into line with the needs of disabled people in this country, for the problem impinges directly upon the operation of every hospital, every school, and every organization that serves people.

The gap between need and available service exists because of three principal blocks—insufficient funds, facilities, and trained personnel. These needs were recognized in 1954 by the President, who submitted to Congress comprehensive plans for a dynamic expansion of the Nation's resources for rehabilitation, setting a goal of 200,000 disabled to be rehabilitated annually. The bulk of these plans is embodied in the Vocational Rehabilitation Amendments of 1954, which were approved unanimously by Congress and signed into law by the President in August 1954. As a result, we now have a basis for a nationwide frontal attack on disability.

The new law provides for a substantial increase in grant-in-aid funds for the state agencies and for increased flexibility in their use. In addition, under this

new law grants can be made for the first time to private, nonprofit groups whose activities will aid the national expansion. Further, provision was made for traineeships and training grants to institutions preparing people for professional work in the various disciplines engaged in vocational rehabilitation. This will help to alleviate the severe shortage of professional personnel, which has constituted one of the major bottlenecks.

The law not only revised the financial basis for the program but also provided a long list of administrative and technical refinements that have made the operation of vocational rehabilitation more flexible and effective. For example, under the former law, federal funds could not be used to help pay the cost of hospitalization beyond 90 days, regardless of how favorable the prognosis might be. The new Act removed this restriction, making it a matter of professional judgment by the physician and the rehabilitation agency.

The 1954 amendments also called for the creation of a national advisory council to assist in carrying out a program of grants for special projects. These grants are made to both public and voluntary agencies to help support research and demonstration projects that hold promise of solving vocational rehabilitation problems of national significance. Through them, we can look to the opening of doors that so far have remained closed in the search for new knowledge and better methods in rehabilitation.

Two other measures passed by the 83rd Congress also will help us reach and serve more disabled. One is the Medical Facilities Survey and Construction Act, which contains a companion piece to the new law on vocational rehabilitation. This new act gives new direction to the program for federal aid for hospital construction by encouraging the development of certain types of health facilities urgently needed today, including rehabilitation facilities to serve thousands more disabled persons annually. These rehabilitation centers will provide the most advanced technics of physical medicine and other services needed to help overcome the crippling effects of disability and to start the handicapped person on the right road to maximum activity and usefulness.

The other measure, an amendment to the Social Security Act, provides for the preservation of insurance rights of eligible individuals who become totally disabled while covered by Old-Age and Survivors Insurance. Since it is the policy of the Office of Vocational Rehabilitation, as it was the policy of the Congress, to encourage states to have their rehabilitation agencies make the determinations of disability required by this act, many thousands more persons who might be restored will be brought to the attention of state agencies soon after they become disabled.

Thus today we are in the midst of a major attack against the problems of disability, one that is utilizing the resources of voluntary groups, communities, public health and workmen's compensation agencies, the social security system, and the public vocational rehabilitation program.

The actual number of handicapped persons rehabilitated and placed in productive work climbed from 55,825 in 1954 to 57,979 in 1955, an increase of more than 2,000 during the first year under the new act. While the increase in the number restored is significant in itself, the fact that the state-federal program, in less than one year, could "tool up" under a new law, meet its obligations under related new legislation, lay the foundation for future growth, and still increase the number of disabled persons served and rehabilitated, is a most encouraging and auspicious beginning. This success in the initial year under a comprehensive new act was due to the prompt action of the states in taking advantage of the law and to the interest that the legislation created among the many voluntary and professional groups.

Last year also marked the inauguration of a new program of training for rehabilitation personnel, to overcome what the Senate Committee on Labor and Public Welfare described as "one of the most serious problems in rehabilitation." As of August 15, 1955, slightly more

than a year after the President signed the law into effect, 91 teaching institutions had arranged their curricula and plans to cooperate and had received grants to help expand their teaching programs in rehabilitation. To aid students, 104 traineeship grants were made to institutions, which in turn made traineeship awards to nearly 600 students in physical therapy, occupational therapy, rehabilitation counseling, social work, and other fields closely allied to vocational rehabilitation.

At the same time, a program of training grants for physicians in rehabilitation was established, through which basic curricula could be broadened to include rehabilitation concepts and technics. For residency training in physical medicine and rehabilitation, 44 grants were made; in this field the Office of Vocational Rehabilitation now administers residency grants in physical medicine and rehabilitation formerly provided through the National Institutes of Health.

These first steps were completed in the first year, as a beginning of what it is hoped will be a substantial contribution by the Office of Vocational Rehabilitation to the nation's training needs in rehabilitation. During this present fiscal year, which began July 1, $2,075,000 is available for teaching grants and traineeships — a sizable increase over last year's funds.

The approach to the shortage of rehabilitation facilities by the Office of Vocational Rehabilitation is showing equally tangible results. It is working both toward the expansion and improvement of existing facilities and toward the construction of new ones. Efforts in this connection are based both upon Public Law 565 and upon the closely allied Medical Facilities Survey and Construction Act of 1954.

Using funds being made available to the state vocational rehabilitation agencies during the current fiscal year, 27 agencies have made plans to establish rehabilitation facilities of various types; 33 agencies have provided for the establishment of sheltered workshops. Funds also have been made available to the various states to encourage better liaison between rehabilitation agencies and state hospitals and other institutions with physical medicine and rehabilitation programs. State rehabilitation counselors are working on the scene in the hospitals and clinics involved. Early referral for nonmedical rehabilitation services is, of course, a primary objective.

Among the grants made for expanding or improving existing rehabilitation facilities are several of particular benefit to the severely disabled, for example, funds in partial support of a model citrus grove have been awarded to help the blind learn how to raise citrus fruits and to demonstrate how their abilities can best be adapted to a specific agricultural pursuit. Under another grant, a vocational rehabilitation agency is working with a local health department in setting up "treadmill" equipment for specialized evaluation of the work tolerances of heart disease sufferers. There are many other projects of an equally stimulating nature — projects in which the investment will bring excellent returns of a social, economic, and humanitarian nature.

In research in rehabilitation problems, encouraging progress is being made. During fiscal year 1955, 20 "special project" grants were awarded for original research into a variety of rehabilitation problems of concern to a number of states. All such grants were made upon the recommendation of the National Advisory Council on Vocational Rehabilitation; the organizations receiving them were required to provide at least one dollar for each two dollars in federal funds awarded.

A number of these special project grants went into research concerning the problems of the severely disabled. One was made to a New York organization to develop an evaluation and work classification system for cerebral palsied adults. Another went to a Denver hospital for partial support of a project to rehabilitate sufferers from chronic intractable asthma who are unable to work. A major aspect of this project will be the establishment of a complete rehabilitation center within the hospital as a demonstration that may be followed elsewhere.

Other grants were made to a Los Angeles organization to study the industrial assimilation of epileptic persons in a community workshop environment and to an Alabama group for developing means of organizing and financing statewide marketing facilities for products made by shut-ins.

These, then, are some of the things the Office of Vocational Rehabilitation is doing through the state-federal partnership to cope with the gaps in the personnel, facilities, and research fields. Although progress is being made, it will have real meaning only if it is part of a total teamwork approach to rehabilitation. If we are to meet the needs of the disabled workman, we must have a team concept that extends beyond the specialties within a hospital and brings into play the energies, talents, and support of whole communities. We should not permit ourselves the illusion that the injured workman can receive adequate rehabilitation without first ensuring that the community is prepared to furnish comprehensive services.

There is a very real need today for physicians generally to recognize that rehabilitation in its broadest sense is part of the medical care that should be demanded as a right of the individual to total compensation for his injury. The specialty of physical medicine and rehabilitation has a major interest in this principle and perhaps can do as much as any other group to further the concept as part of compensation medical care.

Problems of Management in the Placement of Handicapped Workers

Earl R. Bramblett
Detroit

One of the first principles of plant operation is, "put the right people in the right places." This involves the careful placement of employees to make sure they are physically, mentally, and temperamentally fitted to the jobs they are expected to do.

Management's problems in placing the so-called handicapped individual are the same as the problems of placing everyone else. We are all handicapped in one way or another. The difference is in degree. For example, a recent analysis was made of the physical characteristics of the 100 employees with the longest seniority in one of the plants. All but 27 of the 100 had one or more physical limitations that restricted their placement on jobs.

While placement problems tend to be more numerous and perhaps difficult in employees who are older, the problems are by no means restricted to that group. In a group of 100 employees selected at random who had 5 years' seniority, 55 had one or more physical limitations. This illustrates the point that the problem of proper placement of employees is not limited to injury cases or to so-called handicapped people. All of the 200 employees referred to were working on regularly constituted jobs. They were producing satisfactorily and were receiving the full wage for their respective job classifications.

The problem of placement of the employee who has been injured or who has a physical condition that restricts his placement boils down to this: Is a job available that he can do without undue risk to himself, other employees, or to the company?

In determining the answer to this question, the plant physician plays an important role. Management relies upon his professional advice in making determinations involving medical questions. In this regard the plant physician is in a good position to be of expert assistance because he not only can determine the condition of the employee but he can also study the requirements of a given job under consideration and the work environment involved. In this way he can give concrete specific advice based upon knowledge of the elements involved. The plant physician is in a much better position to determine the employee's ability to do a job than the employee's family doctor who may have no first-hand knowledge of the job requirements.

Employees frequently return from sick leave with a note from the family physician saying, "O.K. for light work." Such a recommendation is not very helpful. The question is very specific: Is the employee able to do this or that job? The decision must be yes or no — there is no middle ground. Management looks to the plant physician for the right answer.

Of course, the plant physician cannot personally review every job assignment and transfer. To insure the continuing proper placement of handicapped people on the job, it is necessary to establish a procedure for passing along to supervision some information regarding the limitations on placement determined by the plant physician. Such a procedure must be simple and nontechnical. The plant supervision cannot be expected to understand medical terminology. One rather common procedure is for the plant physician to classify employees for job placement purposes into several simple categories that indicate the types of work the employee should not do. For example, in the following procedure there are nine categories:

Lift Limit and No Continuous Lifting: This restriction applies to employees who have musculoskeletal involvements such as arthritis and previous history of back trouble.

Part of the **Symposium on Rehabilitation of the Injured Worker** presented at the Thirty-third Annual Session of the American Congress of Physical Medicine and Rehabilitation, Detroit, August 30, 1955.

Industrial Relations Department, General Motors Corporation.

Sit-down work: The individuals who are restricted to sit-down work, mainly women, are those with varicose veins of the legs, or foot deformities.

No Dust, Fumes, Acid Heat or Water: Certain employees are allergic to flux and others suffer gastrointestinal upsets from odors. Some have chronic sinus trouble that limits the jobs on which they can work without aggravating the sinus condition. In this group, also, are those with arthritis who suffer when exposed to water or dampness.

No Climbing: This group of employees are those who have moderately high blood pressure or a history of fainting. They should not work on ladders or scaffolds.

No Pedal Tripping, Limited Arm Movement, and Limited Bending: This applies to employees who have varicose veins or other leg deformities. The limited arm movement applies primarily to cases of bursitis and arthritis involving the shoulder and elbow joints. The limited bending applies primarily to employees with arthritis of the spine or previous history of back trouble.

Must Wear Truss: This applies to all employees who are known to have hernias. These employees are usually not placed on any heavy operation, or other operation where the movement factor might displace the truss.

Day Shift Work Only: In this group are employees with ulcers, diabetes, or other conditions requiring regular diet and sleep.

Must Wear Safety Glasses on All Jobs: This type of restriction applies to those individuals whose visual acuity in one or both eyes is of such a nature that should they either lose an eye, or have a partial loss of vision as a result of an occupational injury, they would be seriously handicapped from a visual aspect.

Consult Medical: This group consists of employees whose general physical condition is such that a simply worded restriction will not cover all of the aspects. In this group are persons with a history of actual heart trouble, ruptured gastric ulcers, fusion of the back, or other major conditions that require direct medical approval of their placement.

After examining the employee, the plant physician enters on the employee's record, which is available to supervision, all of the limitations on placement that are applicable. If the supervision encounters difficulty or needs further advice, the plant physician is consulted.

There is nothing spectacular about this approach to job placement. It is merely a systematic method of trying to fit the abilities of the employee to a regularly constituted job that he can handle. When that is done, the employee is not "handicapped."

Seniority rules play an important part in present day labor relationships. If they are carried to the extreme of regulating job assignments and transfers, they can interfere with the proper placement not only of employees who have been injured, but also with the much larger number of employees who have physical limitations due to disease or advancing age. Seniority rules should not include such limitations. If management is to utilize the services of employees in an efficient manner, management must have the right to place employees on jobs they can do efficiently. Specifically, this should include the right to make changes in job assignments within a classification without seniority limitations.

In a broad general classification, such as assembly, there are wide variations in the specific requirements although all of the jobs pay the same wage rate. In the selection of job assignments within a classification, judgment as to proper placement can be exercised. Likewise, in transfers between classifications of work paying the same wage rate, there should be freedom from seniority restrictions so that the function of proper placement is not impaired.

Any seniority rules that regulate the placement of employees can limit the freedom of opportunities for placement of employees with handicaps. Where the labor agreement contains rigid detailed seniority rules, opportunities for selective placement is thereby limited.

Multiple or chain bumping by seniority in a reduction of the work force can also disrupt the placement job that has been done. In the interest of efficiency

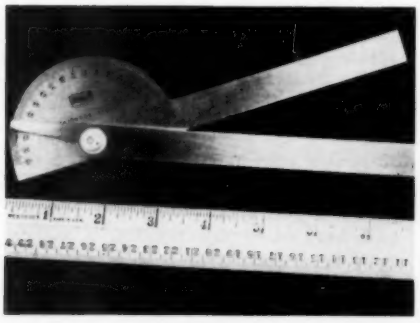
as well as the proper placement of employees with physical handicaps, management should insist that seniority rules be reasonably flexible and practical.

Just as restrictive seniority rules can operate to obstruct placement of handicapped people, so also can certain laws and interpretations of laws in some of the states. For example, a workman's compensation law that is interpreted to hold the employer responsible for deaths from heart attacks at work, on the same basis as a fatal industrial injury, can operate to make it more difficult for an individual with a heart condition to obtain and retain a job. While legislators may believe that they are advancing the welfare of the handicapped people when they place such obligation for preexisting or nonoccupational conditions on the employer, the effect may be just the opposite. The matter of legislation is beyond the province of the employer or the doctor except to the extent that he can contribute to a better understanding of the point.

In summary, management's problems in the placement of handicapped employees are the same as those involved in the placement of all other employees. It is a matter of utilizing the skills and abilities that people have. The difference is in degree.

Clinical Note: A Versatile Goniometer

Frederic J. Kottke, M.D.
Minneapolis



A versatile stainless steel goniometer approximately 8 inches long with a double 180 degree protractor is shown in the illustration. The goniometer is large enough to be used on any of the joints of the body, small enough to make measurement of finger joint motion easy, and of convenient size to be carried in a pocket. The indicator arm is attached to the protractor by a knurled nut with a lock washer so that the friction between the two can be varied to any desired degree. Consequently, the goniometer can be made to retain any position in which it is placed.

Manufacturer: Tubular Micrometer Company, St. James, Minn.

Distributor: Professional Colleges Bookstore, University of Minnesota Medical Center, Minneapolis 14, Minn.

Price: $3.00.

From the Department of Physical Medicine and Rehabilitation, University of Minnesota.

The Editorial Board of the ARCHIVES encourages members of the Congress and Academy to submit short descriptions of equipment which they have found useful but which is not yet advertised as available to the profession. The source from which the equipment can be purchased and also the cost should be included for equipment so described.

Experiences with Bobath Method of Treatment of Cerebral Palsy

Odon F. von Werssowetz, M.D.
Empress Y. Zedler, Ph.D.
Christine V. Burton, B.S., O.T.R.
Hector D. Lozano, B.S., R.P.T.
Gonzales, Texas

The accepted characteristics of a true spastic are hypertonicity of certain muscles, hyperactivity of deep reflexes, and presence of pathological reflexes. The latter are considered primitive defense responses that can be elicited in normal infants up to seven months of age but are suppressed after this age by cerebral inhibition. In a child or adult they are released only under pathological conditions, when the lower motor neuron loses the inhibitory influence of the higher centers.

The orthodox neuromuscular re-education of spastic paralysis is based on establishing isolated muscle contractions, striving for relaxation and for control of the aberrant reflexes. This method has proved to be of value only in a limited number of cases; the improvement obtained has been disappointingly slow. Search for new approaches in treatment have brought out two new concepts: the use of reflexes as a basic principle of treatment and the use of developmental sequence in progression. Neither method tries directly to re-educate the so-called involved muscles.

The use of reflexes in treatment of spastic conditions is not new. It is based on the research work done by Magnus[1] and deKleijn[2] on tonic neck and labyrinthine reflexes. The developmental method, based primarily on the works of Gesell[3, 4] and Schaltenbrand,[5] stresses the natural development of motor control as a guide in therapy.

The Bobath method of treatment combines these two new concepts.[6-10] It is based on the assumption that normal movements and correction of posture are impossible in the spastic as long as the muscle tonus is exaggerated and released tonic reflexes and disordered activity of lower centers of the central nervous system are present. Therefore, the patient must acquire an ability to inhibit his abnormal postural and movement reactions. He must also develop such automatic movements as the righting reflexes and equilibrium reactions before he can be expected to have normal coordination in voluntary movements and skills. It is important that he proceed in developmental sequence of patterns of movement in treatment.

The Bobath method uses a unique technic which emphasizes positioning by passive movements without evoking abnormal postural reflex activity. The abnormal postural patterns assumed by the patient in various positions are evaluated, then the patient is placed in positions that are the reverse of those abnormal patterns. These reversed postures are referred to as reflex inhibiting postures. In the beginning, these reflex inhibiting postures are applied to proximal parts of the limb as they provide most effective reduction of spasticity. When a patient is placed in such a position, the muscular tension rises at first and may progress into violent spastic contractions resisting this reflex inhibiting position; however, when this position is successfully maintained for awhile, waves of relaxation occur. These, at first, are of very short duration — about 2 or 3 seconds — but as treatment progresses, the relaxation periods increase in duration. During these relaxation periods, pressure is released to permit the patient to "feel" the normal muscle tonus and is reapplied at the first sign of increased tonicity. No mechanical or static restraints of any kind are used because they do not provide the release of pressure in ratio to the wave of relaxation and the patient will not get the "feeling" of proper

Read at the Thirty-third Annual Session of the American Congress of Physical Medicine and Rehabilitation, Detroit, September 2, 1955.

From the Gonzales Warm Springs Foundation.

muscle tonus for the movement. As waves of relaxation become longer and tension decreases, transference of control to the patient is sought by a passive movement of each joint within the range of relaxation. This gradually progresses into an assistive movement, with the patient participating actively, and finally into an active movement by the patient alone while maintaining normal muscle tonus.

The whole body of the patient is placed in reflex inhibiting position, because only in this way may control be established over the general tendency to spasticity, which can originate at any joint. Placement in these positions does not preclude the possibility that abnormal reflexes will be voluntarily inhibited. Only the conceptual adjustment of the patient to these positions will result in unassisted reflex inhibition. If the patient is unable to adjust himself and continues to resist and assumes abnormal patterns of posture upon release, then the technic should be modified as otherwise it only stretches the spastic muscles.

The reflex inhibiting positions should be considered not as "static postures" but rather as "dynamic postures" which the patient cannot at first perform. Each reflex inhibiting position represents a certain stage or link in a movement pattern. Eventually, the patient may connect them by moving in sequence from one position to the next more complicated, thus performing a normal movement pattern.

The Bobath method of treatment may be viewed as falling into three stages. During the first stage, which should not last longer than 24 sessions, the patient is taught to relax the antagonist muscle or muscles while the physical therapist performs simple basic movements. At the first sign of assistance or resistance by the opposing muscle, the movement is stopped. In this stage the patient perceives and becomes familiar with the "feel" of normal tone.

During the second stage, which may last indefinitely, a combination of simple basic movements is gradually built up until the therapist is able to perform a whole range of passive movements with the affected parts, while the patient learns to relax corresponding antagonists at any stage of the movement pattern. The patient is gradually allowed to assist in movement during this stage. The goal of this stage is to teach correct concept of movement patterns.

In the third and last stage, which the Bobaths state may also last indefinitely, but which they optimistically suggest may begin to show results within the year, active movements by the patient are performed by teaching him to arrest a movement pattern at any point without the affected part going into spasticity.

Pilot Study

To evaluate the efficacy of the Bobath method of treatment, a pilot study was undertaken at the Gonzales Warm Springs Foundation Hospital. It was felt that the best evaluation could be obtained only by a team approach; therefore, three therapists — physical, occupational, and speech — were assigned to this research.

For the purpose of illustration, a 4-year-old boy was selected as the subject because he represented a typical spastic involvement with an extension pattern of all body musculature and an involvement of eyes and speech. The child had no voluntary control of movement. He exhibited both an uninhibited labyrinthine reflex and an asymmetrical tonic neck reflex; the latter dominating all behavior, being apparently strongest on the right side. Typical supine posture was hyperextension of neck and trunk, abduction of arms, and adduction and extension of legs.

After observation and evaluation, a program of reflex inhibiting postures was established that presented a sequence of positions in the natural progression of a small child from a relaxed lying to a sitting position. The basic posture of complete inhibition of reflex activity in the supine position was obtained after which the head was released while the inhibition was maintained on trunk, arms, and legs. Later, the hips were allowed to extend passively (fig. 1). Progress was sequential with the release of one position at a time until complete full range

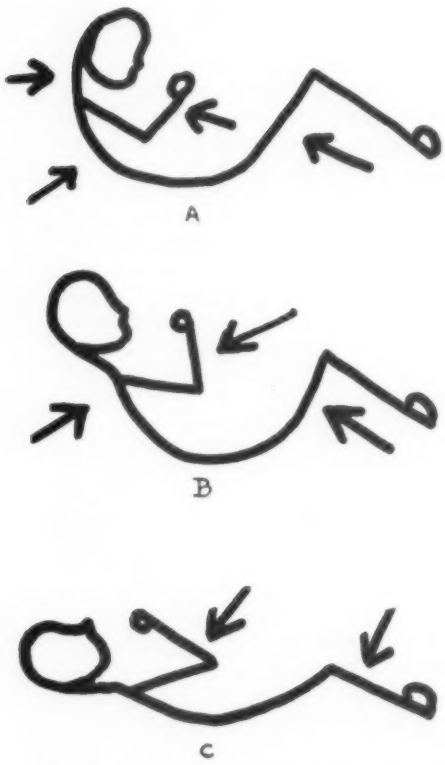


Fig. 1 — Basic supine posture: *A*, basic posture of complete inhibition of reflex activity; *B*, head released, inhibition maintained on trunk, arms, and legs; *C*, same passive extension of hips.

of motion was obtained in the lying position. At that time, attempts were made to inhibit the asymmetrical tonic neck reflex.

Another reflex inhibiting posture was used concurrently with the patient in a prone position with arms flexed and head and legs extended (fig. 2). The knees were released first. This proved to be a difficult position to maintain because of extreme degrees of spasticity in the quadriceps and adductor muscles. From this, progression was made to flexing the elbow, then to kneeling, and eventually to sitting on the heels.

The third basic posture was an incline sitting position with arms supporting the body at sides, head extended, hips and knees flexed (fig. 3). This was the primary attempt to develop an upright sitting position without arm support. Again, this was obtained by gradual release of single positions.

Results

Results of this pilot study were not conclusive because of lack of sufficient time of observation; however, some interesting observations have been made. The most important of these is that the patient, in most positions, did develop increased periods of relaxation after inhibition. Within five months of treatment, these periods increased in frequency and in duration. They increased from two seconds to several minutes. There also is a positive correlation between decrease in muscular hypertonus and increase in duration of the relaxation periods. In addition, some spontaneous relaxation occurs, both in and out of treatment situations, with a lessening of tension at all times.

Speech has developed in the following sequence from no phonation except reflexive crying: inhibition of sucking reflex when mouth was stimulated; imitation of mouth postures of the therapist, such as closing and puckering lips; voluntary crying and laughing; production of back vowels in supine position; production of front vowels in prone position; spontaneous vocal play with vowel sounds; and back consonant sounds now used in intentional jargon for purpose of communication.

This patient gained some ability and control of purposeful movement at shoulders and hip joints. Free activity on a mat resulted in some complete rolls.

Discussion

From this pilot study, it is evident that the Bobath method of treatment of spastic paralysis has a sound physiological basis and is practical in application. It must be noted, however, that to obtain relaxation of severely spastic patients, at least two (preferably three) therapists are required. The progress in neuromuscular re-education appears to be better with this method than with the orthodox treatment. It is believed that some modification must be developed that will make the program applicable in most cases of cerebral palsy. Although the

method of treatment appears to be promising, more studies and observation are required over several years before definite conclusions can be reached.

Summary

An outline of the Bobath method of treatment by reflex inhibiting position is discussed. The basic hypothesis is that spastic disorders resulting from central nervous system involvement are due to released and disordered activities of lower and more primitive centers that are characterized by abnormal strength and distribution of muscle tonus, to the absence of normal development or the presence of acquired impairment of automatic motor activity, and to inadequate inhibitory control, which interferes with the development or the use of skilled and independent movement.

The Bobath method combines the use of reflexes and developmental ideas. It accepts the neuromuscular status as it is found in the patient and attempts to build up a more differentiated pattern by starting from the existing primitive and reflex movements.

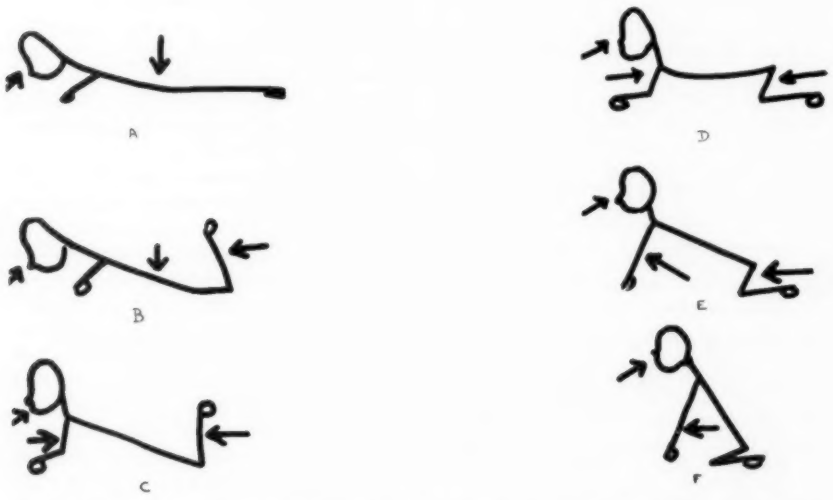


Fig. 2 — Basic prone posture: *A*, arms flexed, head and legs extended; *B*, knees and arms flexed, elbows extended; *C*, head extended, hips straight, knees, arms, and elbows flexed; *D*, kneeling, head extended, all extremities flexed; *E*, elbows allowed to extend; *F*, resting on heels.

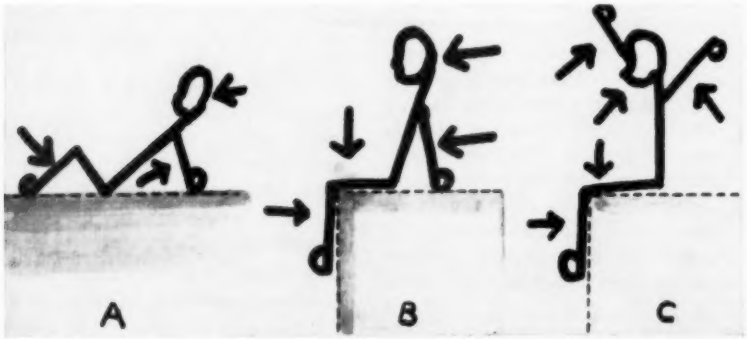


Fig. 3 — Basic sitting position: *A*, arms at sides, head extended, hips and knees flexed; *B*, on plinth, arms at sides; C, arms overhead to straighten trunk and balance head.

References

1. Magnus, R.: Some Results of Studies in the Physiology of Posture. Lancet **2**:531 (Sept. 11) 1926; **2**:585 (Sept. 18) 1926.
2. de Kleijn, A.: Experimental Physiology of the Labyrinth. J. Laryngol. & Otol. **38**:646 (Dec.) 1923.
3. Gesell, A., and Amatruda, C. S.: Developmental Diagnosis: Normal and Abnormal Child Development, Clinical Methods, and Pediatric Applications, ed. 2, New York, Paul B. Hoeber, Inc., 1947.
4. Gesell, A.: Infant Development: The Embryology of Early Human Behavior, New York, Harper and Brothers, 1952.
5. Schaltenbrand, G.: Some Observations on the Development of Human Motility and on Motor Disturbances. Bull. New York Acad. Med. **3**:534 (Aug.) 1927.
6. Bobath, B.: A Study of Abnormal Postural Reflex Activity in Patients with Lesions of the Central Nervous System. Physiotherapy **40**:259 (Sept.) 1954; **40**:295 (Oct.) 1954; **40**:326 (Nov.) 1954; **40**:368 (Dec.) 1954.
7. Bobath, B.: The Importance of the Reduction of Muscle Tone and the Control of Mass Reflex Action in the Treatment of Spasticity. Occup. Therapy **27**:371 (Oct.) 1948.
8. Bobath, B.: A New Treatment of Lesions of the Upper Motor Neurone. Brit. J. Phys. Med. **11**:26 (Jan.-Feb.) 1948.
9. Bobath, K., and Bobath, B.: Spastic Paralysis; Treatment of by Use of Reflex Inhibition. Brit. J. Phys. Med. **13**:121 (June) 1950.
10. Bobath, K., and Bobath, B.: A Treatment of Cerebral Palsy Based on the Analysis of the Patient's Motor Behaviour. Brit. J. Phys. Med. **15**:107 (May) 1952.

Discussion

Harriet E. Gillette (Atlanta, Ga.): It is gratifying to have new aspects cast on a subject that has become threadbare from innumerable articles and discussions; Dr. von Werssowetz is to be congratulated for having pursued his interest so thoroughly in this case. However, certain principles must be kept in mind when evaluating any form of therapy of the many-faceted syndrome of cerebral palsy.

Firstly, certain changes, "improvement" if you will, take place as a result of maturation, just as they do in the normal child. These changes are more evident in the athetoid than in the spastic patient because of the lack of contracture formation. Too often doctors and therapists take the credit for accomplishments that would have been achieved had treatment not been given.

Secondly, the factor of changes in care habits, mental stimulation, and allowance of movement must be considered. Frequently, rapid gains are seen when the only treatment consists of allowing the child to make use of his capabilities.

Finally, the application of a technic to one subject can give no valid criteria for decision as to its merits; the time interval should be sufficient to judge functional gains against amount of treatment.

It would be most interesting to learn the results of employment of the Bobath method in a large group of children, and to contrast their functional gains with those of a control group who were managed on a realistic home program.

Painful Shoulder Syndrome Following Cardiac Surgery

Edward J. Lorenze, III, M.D.
White Plains, N. Y.

The increase in surgery directed toward improved function of the heart has caused these procedures to become precipitating factors in the production of painful shoulder syndrome. During the past year and a half, 57 patients have been admitted to the cardiac rehabilitation service of The Burke Foundation following cardiac surgery. In this group 6 cases of painful shoulder syndrome have been found — one followed left thoracic sympathectomy, one followed left stellate ganglionectomy and cardiopericardiopexy, and 4 followed mitral commissurotomy.

Pain, limitation of range of motion, muscular atrophy and weakness, and resultant impairment of functional activity of the arm are the stigmata of the painful shoulder syndrome. Physical medicine is frequently prescribed for the secondary or complicating findings, which may lead to disability after the initial etiological factor has passed away or been corrected. When the secondary or complicating musculoskeletal factors are treated, the physical medicine prescribed is frequently the same regardless of the etiology since a similar pathological condition develops in the shoulder regardless of initial causes. If the precipitating cause is still active, however, it will have to be corrected before improvement can occur. Many causes are transient, self-limited, or of a chronic nature subject to spontaneous remissions; therefore, prevention of complications is the essential management. A precipitating factor may set off a chain of circumstances in which many other potential etiological factors will come into play leading to the same ultimate pathological condition.

Causes of Painful Shoulder Syndrome

Factors which can cause shoulder disability either singly or as it happens more commonly in combination include:

1. Direct trauma — mastectomy, cardiac surgery.
2. Intra-articular or periarticular disease — arthritis, bursitis, degenerative cuff disease.[1]
3. Paralytic disease of the shoulder musculature — hemiplegia, progressive muscular atrophy, syringomyelia.
4. Reflex sympathetic dystrophy — local vascular disturbance or full shoulder-hand syndrome.[2]
5. Postural factors — guarding, scapulocostal syndrome.[1, 3]
6. Disease of the cervical spine — osteoarthritis,[1] cervical disc.[4]
7. Shoulder girdle syndromes[5]—cervical rib,[6] scalenus anticus,[6] costoclavicular. (Symptoms initially result from interference with the function of the subclavian and axillary artery and/or vein and of elements of the brachial plexus).

Predisposing Factors Inherent in the Shoulder

"The shoulder possesses less stability and less mechanical protection than any other large joint of the body."[7] By the same token it is part of one of the most dynamic areas of the body from the point of view of movement and stress. The capsular ligaments, long and loose to permit the wide range of shoulder motion, give little protection against subluxating forces. The effect of gravity causes constant stress on the soft tissues of the glenohumeral and thoracoscapular articulations; therefore, the muscles and tendons play a relatively more important part in maintaining joint stability. The tendons are partly fused with the joint capsule itself. The shoulder bursae lie in close contact with the capsule and tendons. This intimate association of synovial membrane, capsule, ligaments, and tendons makes multiple involvement likely. The adducted position, in which

Read at the Thirty-third Annual Session of the American Congress of Physical Medicine and Rehabilitation, Detroit, August 30, 1955.

Medical Director, The Burke Foundation; Assistant Professor of Clinical Medicine, Cornell University Medical College, New York City.

the injured arm is most conveniently held, permits contractures and atrophy of the long muscle groups to develop, leading to restriction of range of motion.

It has been well established that flexion or abduction at the glenohumeral joint is accompanied by simultaneous rotation of the scapula so that the glenoid fossa is so situated that there is minimum interference with movements of the humerus by the acromion process or ligaments. This smoothly coordinated scapulohumeral rhythm[8] occurs throughout the range of flexion and abduction, but its greatest rotation occurs in the middle range from 60 to 115 degrees.[9] If scapula rotation is impeded there will be a resultant limitation in flexion and abduction of the humerus.[10]

Lateral or external rotation of the humerus is also an essential component of flexion or abduction beyond 90 degrees. If this does not occur there will be a mechanical blocking of the movement, probably impingement of the greater tuberosity under the acromion process. This rotator cuff mechanism responsible for glenohumeral rotation works as a unit; therefore, a pathological condition in any of its component parts may interfere with adequate function of the entire mechanism. As indicated by its anatomy, function, and location, the rotator cuff is subject to wear and tear, acute trauma, contractures, and adhesions, all leading to pain and limitation of movement.

Operative Procedures Performed

Mitral Commissurotomy: This operation has now been developed to the point where it is an accepted procedure for the management of suitable patients with symptomatic manifestations of hemodynamically significant mitral stenosis. When the left anterior lateral approach is used, a U-shaped incision is made along the left sternal border under the breast and along the axillary line. This involves the pectoralis major primarily. The pericardium is opened, and then the auricular appendage is opened and amputated. A finger fracture of the mitral valve is performed blindly through the atrial orifice, and the auricular stump and pericardium closed with sutures. In the posterior approach, the incision is made over the middle and lower trapezius and latissimus dorsi.

Relief of Myocardial Ischemia: The advances of cardiac surgery in the treatment of congenital and acquired defects have led to increased interest in developing surgical means to improve the coronary circulation in cases of myocardial ischemia secondary to atherosclerosis. Improvement has been reported following omentopexy, aortic-coronary sinus anastomosis, coronary sinus ligation, myocardial implantation of the internal mammary artery, and stimulation of pericardial adhesions by foreign substance.[11] The status of these procedures is still very largely experimental. One approach has been the grafting of a new source of oxygenated blood supply to the heart. Beck delivers a flow of freshly oxygenated blood from the aorta into the coronary sinus and thence into the right auricle by means of a vascular grafted communication. In the second stage, the blood is channeled into the myocardial veins by partially occluding the coronary sinus at the point where the sinus empties into the right auricle.[12] Vineland implants the internal mammary artery directly into the ventricular myocardium.

Thompson has advocated cardiopericardiopexy. He makes an incision over the 5th costal cartilage through the pectoralis major. A segment of cartilage is removed close to the sternum and the anterior mediastinum is visualized and entered. Then a small incision is made in the pericardium. Magnesium silicate (talc, U.S.P.) is introduced and a benign type of chronic pericarditis is produced that stimulates proliferation of the vascular bed.

Another approach to improve coronary circulation has been indirect by means of sympathectomy, with attempted removal of those fibers affecting the heart. In one of our patients, a complete Horner's syndrome was produced. In others, loss of sweating over the left side of the face, chest, and arm developed but no eye changes occurred.

Possible Factors in Painful Shoulder

Direct surgical trauma of the left side of the chest including the pectoralis major, latissimus dorsi, and trapezius occurs. Incisional pain in the skin and subcutaneous tissue is present and superficial nerves are sectioned. According to Glenn, postoperative pain in the substernal region or over the left anterior side of the chest is always a factor immediately after operation; in 15 to 20 per cent of patients this lasts for weeks afterward. The mechanism of this so-called postoperative cardiac pain syndrome has not been explained.[13]

The possibility of trauma to the shoulder in positioning and moving the patient exists. Trauma to the pericardium and myocardium may initiate a reflex sympathetic dystrophy with shoulder pain similar to the mechanism of the shoulder-hand syndrome following myocardial infarction.

Painful shoulder may be related to the inflammatory process of the pericardium and pleura seen in the postcommissurotomy syndrome. The synovial membrane of the shoulder might be similarly involved. This complication of mitral commissurotomy in rheumatic patients is not seen following other cardiac or thoracic surgical procedures in nonrheumatic patients. It occurs in 10 to 38 per cent of patients 10 days to 7 months after mitral commissurotomy. It consists of chest pain, fever, cough, hemoptysis, dyspnea, and arthalgia, with physical findings of pericarditis and pleuritis. It is considered most likely to be a self-limited form of pericarditis and pleuritis induced by the trauma of the surgery. Why there may be a long delay before its onset is not understood.

Prolonged voluntary or involuntary guarding of shoulder movement because of operative pain or anxiety and apprehension may contribute to the development of a frozen shoulder because of muscle shortening in the adducted position. When there is a predisposition to this condition, guarding is very likely to lead to complications.

Preexisting periarthritis or other pathological condition of the shoulder, shoulder girdle, or cervical spine may predispose to this development. Initial symptomatology or an exacerbation might occur as a result of the surgical factors mentioned superimposed on the underlying pathological process.

Case Reports

Transthoracic sympathectomy (left) and cardiopericardiopexy were performed on a 54-year-old white woman with coronary insufficiency due to arteriosclerotic cardiovascular disease. Five months after the operation the patient complained that she had had pain in the left shoulder since the operation which differed from that of her angina; also she had limitation in movement of the shoulder.

Physical examination revealed a posterior scar running down the medial border of the left scapula to the anterior axillary line. Marked tenderness of the trapezius and latissimus dorsi was present along the path of the incision. The skin was not tender, but there was tenderness in the pectoralis major close to its insertion. Passive range of external rotation was limited to 45 degrees. Passive range of flexion and abduction was limited to 90 degrees and caused pain. Actively the patient only flexed and abducted to 90 degrees, and this too was painful. There was atrophy of the deltoid with edema and pain in the hand and weakness of grasp. Extension contractures limited flexion at the metacarpalphalangeal joints to 45 degrees. The radial pulse was not obliterated when the arm was elevated. As a result of the sympathectomy, Horner's syndrome developed, with ptosis, miosis, and anhidrosis of the left side of the face, chest, and left arm. Neurological findings were otherwise normal. Local pain and active range of motion have been improving under treatment with radiant heat and massage to the tender muscle areas and therapeutic exercise aimed at mobilizing all muscle groups of the shoulder girdle, relaxation and lengthening of the short internal rotators, and increasing the strength in the external rotators.

In this case there was only minimal shortening of the adductors of the hu-

merus (latissimus dorsi and pectoralis major) although they, plus the middle and lower third of the trapezius, were the site of local pain and tenderness which was increased by stretching. The diminished active range of motion was caused by involvement of the rotator cuff mechanism, presumably due to inflammation of the short external rotators causing poor contraction and/or inadequate relaxation of the internal rotators. The long adductors played a minor part in limiting abduction mechanically but were the site of fibromyositis contributing to the pain. While local trauma or inflammation may lead to a disturbance of local autonomic control of the vascular bed with resultant "periarthritis," the involvement of the hand suggests this as a case of shoulder-hand syndrome due to presumed reflex sympathetic dystrophy. It is suggested that the initiating factors originated from the pericardium or myocardium itself as a result of the operative procedure rather than from direct injury to the superficial shoulder muscles and tendons. The situation would be similar to those cases of shoulder-hand syndrome seen following myocardial infarction. It is interesting that this case developed after removal of the stellate ganglion, a procedure physiologically akin to stellate ganglion blocks, which have been described as therapeutically effective in the treatment of the condition. In any event it is clear that an autonomic system disturbance is present in this condition and leads to periarthritis in the shoulder and pathological findings in the hand. While the effect of long standing angina can not be ruled out, the patient had no symptoms in the shoulder prior to the operation. Also, since this patient did not have rheumatic heart disease or a mitral commissurotomy, the possible etiological relationship to the postcommissurotomy, syndrome of pleuritis and pericarditis could not have been a factor. It is to be noted that pain and limitation of movement were still present 5 months after the operation.

Mitral commissurotomy was performed on a 42-year-old white man for mitral stenosis due to rheumatic heart disease. Nine months later he was seen again. His chief complaint was a dull pain in the left shoulder that had started immediately following surgery. The pain frequently came on at night and lasted for hours at a time. Physical examination revealed a posterior incision along the medial border of the scapula across the latissimus dorsi to the anterior axillary line at the level of the 5th rib and crossing the pectoralis major for several centimeters. The skin was not tender but there was marked tenderness on palpation of the muscles along the incisional line including the middle and lower trapezius, latissimus dorsi, and pectoralis major. Passive range of motion showed a 45 degree loss of full flexion, abduction, and external rotation of the shoulder. Active movement was present in the same range and caused pain in the internal rotators and adductors. Moderate atrophy of the deltoid had occurred. Radial pulse was not changed by position. Neurological findings were normal. Range of motion in the neck was normal and no tenderness or trigger points were observed in the upper trapezius or under the scapula as seen in the scapulocostal syndrome, although the patient was round shouldered. There was no radiating pain from the neck into the arm.

This patient's disability was due to involvement of the rotator cuff mechanism and the long adductors with traumatic fibromyositis of the muscles involved in the operation. Since a posterior incision was used, this primarily involved the trapezius and latissimus dorsi rather than the pectoralis major. There was no evidence of cervical pathology, faulty postural syndromes, shoulder girdle syndromes, or of a preexisting pathological condition of the shoulder.

Conclusions

Six cases of painful shoulder were found in a series of 57 patients on whom cardiac surgery had been performed, an incidence of 10 per cent. While this high incidence may reflect selective factors within this group, probably many cases elsewhere have been unrecognized. The prolonged period between surgery and the time patients were seen (3 months to 1 year) indicates that the condition is

not self-limiting and requires specific treatment. Signs and symptoms all occurred in the left shoulder. While there was much muscle tenderness on palpation no true trigger points with referred pain were noted. All patients with the condition were over 40 years of age but only one had preexisting disease of the shoulder area (cervical rib and cervical osteoarthritis) and in no instance were symptoms referable to the shoulder present prior to surgery. The operative procedure was clearly the instigating factor. None of the patients on whom initial surgery was performed had had "postcommissurotomy syndrome" and, in these cases at least, no relationship could be established. All of the patients in whom the painful shoulder syndrome developed manifested anxiety reactions of significant degree, which may have contributed to muscle guarding and heightened awareness of postoperative pain. No one mechanism of production of this condition can be singled out. As seen in these cases, the clinical picture may be primarily involvement of the long adductors with fibromyositis and shortening, involvement of the rotator cuff mechanism, shoulder-hand syndrome, or a combination of these. The initial mechanism of voluntary or involuntary guarding because of pain undoubtedly led to shortening of the long adductors or the short rotators or both. Lack of movement and the dependent position of the arm will interfere with venous return and lead to edema of the shoulder and at times the hand. This leads, in turn, to periarticular adhesions, which further limit movement. This course of events can occur solely from immobility and dependency; however, reflex sympathetic dystrophy can also play a part, being initiated either from an area of inflammation of the skeletal muscle or from the surgically traumatized pericardium or myocardium. It is not felt that this constitutes an entirely new mechanism of production of painful shoulder but rather a new initiating factor which triggers many well-known mechanisms.

References

1. Grynbaum, B. B., and Russek, A. S.: Evaluation of 300 Cases of Shoulder Pain. Arch. Phys. Med. & Rehab. **36**:35 (Jan.) 1955.
2. Steinbrocker, O.; Spitzer, N., and Friedman, H.: Shoulder-Hand Syndrome in Reflex Dystrophy of Upper Extremity. Ann. Int. Med. **29**:22 (July) 1948.
3. Russek, A. S.: Diagnosis and Treatment of Scapulocostal Syndrome. J.A.M.A. **150**:25 (Sept. 6) 1952.
4. Martin, G. M., and Corbin, K. B.: An Evaluation of Conservative Treatment for Patients with Cervical Disc Syndrome. Arch. Phys. Med. & Rehab. **35**:87 (Feb.) 1954.
5. Lord, J. W.: Diagnostic and Surgical Aspects of the Shoulder Girdle Syndromes. New York State J. Med. **55**:2021 (July 15) 1955.
6. Hansson, K. G.: Scalenus Anticus Syndrome. S. Clin. North America **22**:611 (April) 1942.
7. Shands, A. R., Jr., and Raney, R. B.: Handbook of Orthopaedic Surgery, ed. 2, St. Louis, C. V. Mosby Company, 1940.
8. Fisk, G. H., and Colwell, G.: Shoulder Movements in Health and Disease. Arch. Phys. Med. & Rehab. **35**:149 (Mar.) 1954.
9. Stookey, B.: The Motofacient and Nonmotofacient Cycles in Elevation of the Humerus. Arch. Neurol. & Psychiat. **4**:323 (Sept.) 1920.
10. Duvall, E. N.: Critical Analysis of Divergent Views of Movement at the Shoulder Joint. Arch. Phys. Med. & Rehab. **36**:149 (Mar.) 1955.
11. Blumgart, H. L., and Paul, M. H.: Surgical Relief of Myocardial Ischemia, editorial, Am. J. Med. **18**:1 (Jan.) 1955.
12. Thompson, S. A., and Akopiantz, L. A.: The Technic of Cardiopericardiopexy for the Surgical Treatment of Coronary Artery Disease. New York State J. Med. **55**:1888 (July 1) 1955.
13. Conference on Therapy: Surgical Treatment of Mitral Valvular Disease. Am. J. Med. **18**:326 (Feb.) 1955.

Extracardial Somatic Factors in the Etiology of Myocardial Ischemia

Case Report

H. I. Weiser, M.D.
Tel-Aviv, Israel

A 45-year-old man was admitted to the hospital as a result of an attack of pain in the left arm and shoulder. An electrocardiogram taken the same day revealed signs of myocardial infarction in the anterior wall. The signs were less prominent next morning, but in the afternoon they again became unfavorable after an abscess was lanced. This had been carried out with the patient's arm in abduction. Much to the surprise of the attending physicians, the electrocardiogram taken the next day was nearly normal. When the drain was removed from the abscess, the pains appeared once more in the shoulder, arm, and chest, and the electrocardiogram showed a pathological condition.

The patient remained in the hospital for one month. During this time the pains did not recur and the electrocardiograms became normal. Three months later, the patient was readmitted to the hospital after a severe attack of pain in the left shoulder, especially affecting the left side of the neck. The pain disappeared 2 hours later. Once more the electrocardiogram showed signs of coronary occlusion. The signs gradually became less prominent; 3 weeks later they were normal.

When a more complete history was taken from the patient the following details emerged. The patient was a porter by trade. He was helping to lift a heavy load from the ground onto a railway wagon when, as the load reached shoulder level, he suddenly experienced a sharp pain in the left arm. He felt as if the arm were paralyzed and he began to have difficulty in breathing. Ten minutes later the pain in the arm subsided but immediately appeared in the neck above the left clavicle, together with a feeling of suffocation and nausea. An hour later all the symptoms had vanished. The patient carried on for 2 hours with heavy physical work, which, however, did not involve raising the arms above shoulder level. On the same day while sitting, with both arms resting on a table, he experienced a similar, but less severe, attack of pain. It was after this attack that the patient was first admitted to the hospital.

The attack that caused the second admission occurred during a bus journey. The patient was sitting, with his left elbow on the window ledge, and talking to friends on his right. Six days after this second admission, the man still complained of occasional pain in the left side of his neck radiating to the elbow. He had a feeling of pressure in the chest and difficulty in breathing.

Physical examination revealed that the left shoulder was higher than the right and that the sternoclavicular angles were not equal. Particularly noticeable was the narrowness of the left supraclavicular fossa as compared with the right side. Instead of a depression, there was a convexity, the muscles being spastic, prominent, and tender on pressure, especially the scalenus anticus. The costoclavicular space was narrower on the left side. The first left rib was very prominent; when pressure was exerted on it with the finger, a sharp attack of pain resulted in the chest, arm, and neck.

Since the physical examination appeared to have aggravated the patient's condition, bed rest was ordered for 2 weeks, after which examination was continued. The blood pressure went down to nearly zero in the left arm when the patient raised it to a horizontal position, inspired deeply, turned his head to the right, and hyperextended his neck. At the same time, the identical pains reap-

Director, Institute of Physical Medicine, Municipal Hospital, Hadassah, Tel-Aviv; Consultant, Government Hospital, Jaffa.

peared and remained for 24 hours after this short examination.

An explanation for the asymmetry of the thoracic inlet was found in the x-ray, which showed a structural cervicothoracic scoliosis with convex rotation of the upper thoracic vertebrae.

This case presents good clinical evidence to show how an extracardial pain of somatic origin may initiate myocardial ischemia. Potain and Trousseau[1] have described areas of "Angine renverse." Cohen[2] has presented the case of a war casualty who, 26 years after the amputation of his left arm, began to suffer from angina of effort. Pressure on the neuroma in the stump caused pain in the phantom limb together with typical anginal pains. Gold and his associates[3] have also inferred that severe extracardial pain can affect the heart. They noticed marked changes in the T-wave of the electrocardiogram in 30 patients suffering from angina of effort or coronary sclerosis when they made energetic movements of the arms in which the circulation was impeded by tourniquets.

The case presented in this report also shows that strong neural impulses from a somatic source are capable of initiating anginal pains and, furthermore, under certain conditions can be a factor in the occlusion of a coronary artery.

Symptoms in the patient were caused by stimuli at two points. One irritation occurred in the region where the axillary and subclavian vessels run together with the brachial plexus beneath the coracoid process of the scapula and behind the pectoralis minor muscle. Lifting the arm above the horizontal position caused compression of vessels and plexus by the stretched pectoralis minor muscle (subcoracoid-pectoralis minor syndrome).[4] These structures were subject to pressure at a second point, where they pass between the clavicle and the first rib. Owing to the asymmetry of the thoracic inlet this region was very narrow in the patient discussed (costoclavicular compression syndrome).[5]

Although this seems to be the first report of a visceral complication resulting from distortion of the thoracic inlet due to structural cervicothoracic scoliosis, I do not believe that similar cases are so rare. It is always worthwhile to examine the structure of the upper part of the skeleton if there is a typical history of pain caused by hyperabduction of the arm, hyperextension of the cervical spine, deep inspiration, or by all of these factors combined. It may be possible to prevent myocardial ischemia in such cases by avoiding the reflexes that are capable of initiating coronary spasm or sometimes even coronary occlusion.

The author is grateful to Dr. N. Wolf, Internal Department III for calling attention to this patient, and to Dr. S. Lew, Cardiological Institute, of Hadassah Hospital for carrying out repeated electrocardiographic examinations.

References

1. Potain and Trousseau, cited by Bonica, J. J.: The Management of Pain, Philadelphia, Lea & Febiger, 1953, p. 115.
2. Cohen, H., and Jones, H. W.: Reference of Cardiac Pain to Phantom Left Arm. Brit. Heart J. **5**:67 (Jan.) 1943.
3. Gold, H.; Kwit, N. T., and Modell, W.: Effect of Extra-cardiac Pain on Heart. A. Research Nerv. & Ment. Dis., Proc. (1942) **23**:345, 1943.
4. Falconer, M. A., and Weddell, G.: Costoclavicular Compression of the Subclavian Artery and Vein; Relation to Scalenus Anticus Syndrome. Lancet **2**:539 (Oct. 30) 1943.
5. Wright, I. S.: Neurovascular Syndrome Produced by Hyperabduction of Arm. Am. Heart J. **29**:1 (Jan.) 1945.

medical news

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

In Memoriam

Dr. Emil J. C. Hildenbrand, 51, of Washington, D. C., died April 16, 1956, of a brain tumor. He was a member of both the Congress and Academy for many years. He served as associate professor of surgery at the Georgetown University School of Medicine; medical director of the Potomac Electric Power Company; chief consultant at the Cambridge-Maryland Hospital in Cambridge, and on the staffs of the Georgetown University and Garfield Memorial Hospitals.

Physical Medicine and Rehabilitation Awarded First Honors

At the Oklahoma State Medical Meeting, May 6 to 9, 1956, the top entry from among more than 40 scientific exhibits, was presented by the Department of Physical Medicine and Rehabilitation of the University of Oklahoma Medical Center, Veterans Administration Hospital, and the Okmulgee Rehabilitation Center. Doctors Herbert Kent, University of Oklahoma Medical Center; Ella Mary George, Veterans Administration Hospital, Oklahoma City, and Shelby G. Gamble, Okmulgee Rehabilitation Center were responsible for a live demonstration of amputees and paraplegics at the convention.

A Graduate Program In Rehabilitation Counseling

Surveys of current efforts in rehabilitation of the handicapped clearly point out the increasing need for well trained rehabilitation counselors. Federal, state, and community agencies are increasing in number, and existing ones are seeking additional counselors. Impetus to meet this need has been given by Public Law 565 (83rd Congress) which made available to training institutions funds for expansion of programs and for stipends to qualified trainees in Rehabilitation Counseling. Southern Illinois University has been selected to cooperate with the Office of Vocational Rehabilitation, Department of Health, Education and Welfare in the training of such professional personnel.

A limited number of traineeship grants amounting to $1600 for the academic year are available to properly qualified graduate students. These stipends are granted on a year to year basis, and a particular student can receive one for a maximum of two years. Application forms may be secured from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare or from the University. Students are also encouraged to write directly to the Graduate School for particulars on fellowships and scholarships, and to academic departments for information on graduate and research assistantships.

For further information, write to Dr. Guy A. Renzaglia, Coordinator, Rehabilitation Counseling, 601 W. Grand Ave., Southern Illinois University, Carbondale, Ill.

American College Health Association

The Committee on Research of the American College Health Association announces the establishment of the Continental Casualty Company grants in support of promising research in student medicine.

The purpose of the Continental Casualty Research Grants is to encourage investigation which will promote the physical and mental health of college students and benefit student medical practices. Grants will be limited to research projects related to these objectives.

Two grants of $500 will be made annually. One grant will be awarded to support research in a college of less than 2,000 enrollment. One grant will be awarded to a college of more than 2,000 enrollment.

Grants can be used for either clinical or experimental research. The funds can be used as the sole source of support for exploratory or small-scale studies. The funds can be used in conjunction with college or other funds to support sections of a large-scale research project.

Grant recipients will be selected annually by the Committee on Research of the American College Health Association. Member colleges are invited to submit research proposals (6 copies) at any time. Recipients will be announced at the annual meeting of the Association based on all proposals received by February 1 of that year. Recipients will be selected according to the merits of the research design and the apparent value of the project to the field of student medicine.

Proposals can be mailed to John Summerskill, Ph.D., Chairman, Committee on Research, Student Medical Clinic, Cornell University, Ithaca, N. Y.

Committee on Rehabilitation Authorized by AMA Board

The Board of Trustees of the American Medical Association has authorized establishment of an Intra-Association Committee on Rehabilitation, to be composed of one representative each from the Council on Medical Service, Council on Medical Education and Hospitals, Council on Mental Health, Council on Industrial Health, Council on Medical Physics, Council on Foods and Nutrition and the Bureau of Health Education.

The Committee will function as a study group and clearing house for rehabilitation matters and will submit recommendations to the Board of Trustees on its findings.

Grant for Study of Rehabilitation Technics

A special project grant of $105,000, which is the first to be allocated in New England by the U. S. Office of Vocational Rehabilitation, has been received by the Robert B. Brigham Hospital, Boston. The grant will support a three-year study of rehabilitation technics on patients suffering from arthritis and other rheumatic diseases. The new program is the first study of its kind in this field and the first to attack the problem on a coordinated community scale. The total cost of the project is $156,000 and the grant is being supplemented by services and funds from the participating agencies as well as financial support from the Arthritis and Rheumatism Foundation.

Applicants for Congress Membership

A. J. Muller, M.D., 6515 N. 2nd St., Philadelphia: Sponsored by Harold Lefkoe, M.D., Philadelphia.

Joseph E. Cox, M.D., VA Hospital, Outwood, Ky.: Sponsored by A. B. C. Knudson, M.D., Washington, D. C.

Milton Holtzman, M.D., 450 Demott Ave., Rockville Centre, N. Y.: Sponsored by Alfred Ebel, M.D., Bronx, N. Y.

Bernard J. Michela, M.D., 509 Glasgow Rd., Hollin Hills, Alexandria, Va.: Sponsored by Charles D. Shields, M.D., Washington, D. C.

Henry F. Parry, M.D., Magee Memorial Hospital, Philadelphia: Sponsored by William H. Schmidt, M.D., Philadelphia.

William D. Loeser, M.D., 48 Windemere Blvd., Eggertsvile, N. Y.: Sponsored by Henry V. Morelewicz, M.D., Buffalo, N. Y.

George K. Arnold, M.D., 5932 Lake Shore Dr., Columbia, S. C.: Sponsored by A. B. C. Knudson, M.D., Washington, D. C.

Ernest Grover, M.D., 1832 Pitt St., N.E., Albuquerque, N. M.: Sponsored by A. B. C. Knudson, M.D., Washington, D. C.

Albert Cohen, M.D., 4242 N. Sherman Blvd., Milwaukee: Sponsored by Ray Piaskoski, M.D., Wood, Wis.

L. Burton Parker, M.D., 1400 Miller Ave., Ann Arbor, Mich.: Sponsored by George H. Koepke, M.D., Ann Arbor, Mich.

Frederick Ziman, M.D., 145 W. 86th St., New York City: Sponsored by Otto Eisert, M.D., New York City.

Torsten Lundstrom, M.D., Hiwassee Hill, Johnson City, Tenn.: Sponsored by A. B. C. Knudson, M.D., Washington, D. C.

Raymond Mundt, M.D., Box 607, Ft. Bayard, N. M.: Sponsored by A. B. C. Knudson, M.D., Washington, D. C.

Harry L. Acker, M.D., Physical Medicine Department, Touro Infirmary, New Orleans: Sponsored by Solomon Winokur, M.D., New Orleans.

Recent Publications by Members

Donald J. Erickson, "Cervical Traction and Other Physical Therapeutic Procedures for Pain About the Neck and Shoulders." Minnesota Medicine, June, 1956.

Joseph G. Benton and Howard A. Rusk, "Rehabilitation of the Patient with Cerebrovascular and Cardiac Disease." American Practitioner Digest of Treatment, May, 1956.

Harry T. Zankel; Bruce S. Sutton, and co-author, "Morbidity in Paraplegics and Quadriplegics." American Archives of Rehabilitation Therapy, March, 1956.

Thomas P. Anderson; Gordon M. Martin, and co-authors, "Thoracic-outlet Syndrome: Evaluation of a Therapeutic Exercise Program." Proceedings of the Staff Meetings of the Mayo Clinic, May 2, 1956.

Mieczyslaw Peszczynski, "Rehabilitation in a Chronic Disease Program." Ohio's Health, March, 1956.

The following articles were published in Department of Medicine and Surgery, Program Guide Physical Medicine and Rehabilitation Service, May 15, 1956:

Delilah Riemer and co-authors, "Hospital Industries at Bedford VA Hospital."

George Dixon and co-author, "Industrial Therapy in a Neuropsychiatric Hospital."

Howard A. Searl and co-author, "Therapeutic Assignments — Hospital Industry — Member Employee Program at VA Hospital, Fort Thomas, Kentucky."

Foreign Medical School Graduates To Be Evaluated

At a recent meeting, the AMA Board of Trustees approved a long-sought program for evaluating foreign medical school graduates. The proposed program is designed to clear up two important facts regarding each foreign medical graduate who wishes to come to the United States as an intern or resident or in any other position that involves medical care of the American public:

The medical credentials of a foreign-trained physician must clearly indicate that

he was graduated from a bona-fide medical school and,

By examination, a foreign medical graduate must demonstrate that he has medical knowledge equivalent to that demanded of graduates of schools in the United States.

Lasker Awards Scheduled at London ISWC Congress

Three Albert Lasker awards for outstanding achievement in the development of services for the physically disabled will be presented at the seventh world congress of the International Society for the Welfare of Cripples in London July 24, 1957.

The awards which are made by the foundation through the International Society every third year, consist of $1000 each and a silver statuette of the Winged Victory of Samothrace. Their purpose is to emphasize, through the recognition of individual and group accomplishments which are internationally significant, the importance of developing improved services for the disabled persons of the world.

Personals

Freeman Fountain, Louisville, Ky., was appointed assistant to the medical director of the Louisville Rehabilitation Center and assistant professor of Physical Medicine and Rehabilitation at the University of Louisville on July 1. — Participating in the program of the Commencement Post-Graduate Seminar sponsored by the University of Louisville School of Medicine in cooperation with the Kentucky State Medical Association and the Kentucky Chapter of the American Academy of General Practice held at the Rankin Amphitheatre of the Louisville General Hospital on Monday, June 4, was **Rex O. McMorris** of Louisville, Ky., who presented "Office Practice of Physical Medicine and Rehabilitation." — **Paul A. Nelson** of Cleveland was elected as an associate member of The American College of Physicians at its seventh annual session held in Los Angeles, April 16-20, 1956. — **C. G. Psaki,** Philadelphia, and assistants recently presented to fifteen prosthetists and orthotists a 15-hour course which entailed basic medical principles pertinent to this group; he was appointed a member of the advisory committee for an Institute on Rehabilitation held at Bryn Mawr College last June by the Department of Social Economy and Social Research; Dr. Psaki and associates participated in the scientific meeting of the Industrial Medical Association of Philadelphia.

Theodore Stonehill, Los Angeles, was lecturer for the University of California, University Extension Division, College of Law on the subject "The Medico-Legal Aspects of Neck Injury." He presented the same subject to the Santa Monica Bar Association on May 14. — At the fifth annual conference of The Institute for the Crippled and Disabled on Rehabilitation in Workmen's Compensation held at the Institute on May 23, **Arthur S. Abramson,** Dobbs Ferry, N. Y., was a participant in the panel discussion, "The Doctor and the Injured Workman." — **Miguel A. Aguilera** of Guatemala, and **Jose I. Tarafa** of Havana, Cuba had recently been in the United States to visit the International Society for the Welfare of Cripples headquarters. — Before the regular meeting of the Sangamon County Medical Society held at the Elks Club, Springfield, Ill., **H. Worley Kendell** and **Joseph N. Schaeffer** of Peoria presented "The Rehabilitation Team and the Family Physician." — **Gregory Bard,** San Francisco, who is Medical Director of Rehabilitation at the University of California Medical Center spoke on "Limb Prosthetics and the Rehabilitation of the Amputee" in a Symposium on Peripheral Vascular Surgery at the University Extension of the University of California School of Medicine. — At the annual meeting of the Canadian Tuberculosis Association held in Niagara Falls, Ont., **C. Robert Dean,** Detroit, addressed the group on the integration of services within a medical rehabilitation facility to provide good patient care. — **Arthur M. Pruce,** Atlanta, Ga., was awarded third prize for his exhibit on "Bony Landmarks in Joint Paracentesis" in the scientific exhibit at the annual convention of the Georgia Medical Association. — At the annual meeting of the Eastern Pennsylvania Chapter of the Arthritis and Rheumatism Foundation, **Philip R. Trommer,** Philadelphia, was elected President of the Chapter. He is also a member of the Medical Advisory Committee of this group together with **Richard T. Smith** of Philadelphia and **Nathan Sussman** of Harrisburg, Pa. — At the fourth annual meeting of the Canadian Association of Physical Medicine and Rehabilitation held in London, Ont., the following were elected to office: **T. H. Coffey,** President, and **G. Gingras,** Vice-President. Participating in the program of this meeting were: G. Gingras presenting "Psycho-social Study of the Upper Extremity Amputees"; **Lewis Cohen** of Detroit presenting "Plethysmography in the Rehabilitation of Patients with Peripheral Arterial Disorders"; and **A. T. Jousse** of Toronto, Ont., presenting "Early Handling of Neck and Back Injuries." — **Albert L. Cooper,** Seattle, addressed the following: Association of Western Hospitals at its 26th annual convention in Seattle with "The Financial Feasibility of Installation of an Occupational Therapy Department in a General Medical Hospital"; Alumni, Swedish Hospital in Seattle at their annual meeting with "Ultra-Sound, Mechanics and Use"; and Washington Association of Nursing Homes at their annual meeting assembled in Yakima, Wash., with "Rehabilitation - Challenge to the Nursing Home of the Future."

Michael M. Dacso, New York City, served as consultant in medicine and rehabilitation at the Federal-State Conference on Aging in Washington, D. C. — **Albert A. Martucci,** Abington, Pa., was presented an Award of Merit by the President's Committee on Employment of the Physically Handicapped for outstanding service in promoting equal opportunity in employment for the physically handicapped, thereby making him eligible for the National Physician's Award. Among the honored guests at this presentation were **William J. Erdman, II, George Morris Piersol,** and **William H. Schmidt,** all of Philadelphia, and **John Fritchey** of Harrisburg, Pa. — **S. Malvern Dorinson,** San Francisco, was the first guest consultant of the newly formed Diagnostic Study Group at Valley Childrens Hospital, Fresno, Calif. He has also been appointed Consulting Physiatrist at the Northern California Cerebral Palsy Residence School in San Francisco.

Newly Registered Therapists

May 11, 1956

Eaton, Joyce L., 918 Ravine Dr., Cleveland Heights 12, Ohio
Fedele, Joseph A., 8925 Carnegie Ave., Cleveland
Stricker, Marjorie H., 3300 Lansmere Rd., Shaker Heights, Ohio

May 18, 1956

Gardiner, Evelyn D., 1613 Webster St., N. W., Washington, D. C.
Noble, Mary Catherine, c/o N. L. Noble, 10044 Piedmont Ave., Detroit

June 8, 1956

Fox, Kenneth L., 8226 Blaisdell Ave., S., Minneapolis 20
Medill, George T., 119 Valley View, Leavenworth, Kans.

June 22, 1956

Bailey, Patricia G., 1033 Cedar Lane, Falls Church, Va.
Barbero, James W., 4143 N. Taylor, St. Louis 15
Baumgartner, Frank G., 77 Birckhead Pl., Toledo, Ohio
Booth, Patricia J., 1802 Copeman Blvd., Flint 4, Mich.
Browning, Jo Ann, RR 1, Box 17, Macedonia, Ill.
Carlson, Mary Helene, R. 2, Box 185, East Jordan, Mich.
Christjohn, Marguerite H., 207 E. 15th Ave., Columbus 1, Ohio
Farr, Mary Jo, 306 Washington St., New Smyrna Beach, Fla.
Farrand, Sally Ann, Jordan, Mont.
Farrar, Margaret D., 2220 Woodside, Ann Arbor, Mich.
Henry, Barbara Ann, 1117 E. McClure Ave., Peoria, Ill.
Hess, Mary Louise, 574 Rutherford Ave., Trenton, N. J.
Hirokawa, Myrtle F., 5058 Washington Blvd., St. Louis 8
Hyma, John T., 130 Hancock St., Findlay, Ohio
Ijams, Joyce A., Atlanta, Ill.
Jock, Margaret Ann, 1826 Mackin Rd., Flint 4, Mich.
Kallenbach, T. Erline, 345 Summerdale, Clayton 24, Mo.
Kraemer, Harriett J., 2944 Wisconsin Ave., Berwyn, Ill.
Kramer, Judith Ann, 24 Stoneyside Lane, Olivette 24, Mo.
Krumbholz, Arlene R., 8925 Birwood, Detroit 4
Loyd, Robert B., 158 Douglas St., Los Angeles 26
Mahon, Sharon R., 5308 Oriole, St. Louis 20
Merten, Lorraine J., RR 3, Hart, Mich.
Pericin, Bernice T., 3034 Roosevelt Ave., Hamtramck 12, Mich.
Quastler, Renate H., 21660 Whitmore, Oak Park 37, Mich.
Reed, Margaret M., 3454 E. Bunell St., Tucson, Ariz.
Storman, Delores W., 1003 N. Second St., East St. Louis, Ill.
Takagi, Margaret U., 415 High St., Ann Arbor, Mich.
Vandeveer, Cornelia P., 5675 Sussex, Box 143, Bloomfield Hills, Mich.
Williams, Eleanor F., 5102 Cass St., Omaha
Wilson, Kay S., 9969 Pierson, Detroit 28

July 5, 1956

Woodson, Milton J., 809 E. Imperial Hwy., Los Angeles

July 9, 1956

Blowen, Alice E., 243 Pearl St., Thompsonville, Conn.
Bruce, Cora P., 45 Prospect St., Auburn, Mass.
Cohen, Lois N., 43 Harding, New Britain, Conn.
Eddy, Margret S., 43 School St., Bloomfield, Conn.
Haslag, Sr. Wilma Marie, 1100 Bellevue Ave., St. Louis 17
Horvath, Julius W., 1529a S. Compton, St. Louis
Jeffrey, Maureen O., 48 Moss St., Westerly, R. I.
Lovell, Phyllis Ann, 6920 W. "C" St., Belleville, Ill.
Lyons, Shirley Ann, 4960 Labadie, St. Louis
Morley, John J., Cheshire St., Cheshire, Conn.
Myers, Elizabeth Ann, 3601 Michigan Ave., Cincinnati 8
Rembisz, Eleanor M., 343 Farmington Ave., New Britain, Conn.
Schutte, Shirley J., 5805 W. 75th St., Prairie Village, Kans.
Walsh, Martha M., 5621 Kingman Ave., Des Moines, Iowa

Watson, Douglas F., Jr., 63 Valleywood Rd., Cos Cob, Conn.

Wulf, Maureen P., 1801 Cambridge Lane, St. Louis 21

Books Received

Books received are acknowledged in this column as full return for the courtesy of the senders. Reviews will be published in future issues of the journal. Books listed are not available for lending.

James Parkinson (1755-1824): A Bicentary Volume of Papers Dealing with Parkinson's Disease, Incorporating the Original "Essay on the Shaking Palsy" edited by Macdonald Critchley; **The Nature of Hypnosis** by Paul Schilder; **Clinical Orthopaedics (Number Six)** edited by Anthony F. DePalma; **Stress — 5th Annual Report, 1955/56** by Hans Selye, and Gunnar Heuser; **Biology of Poliomyelitis** edited by Roy Waldo Miner; **A Manual of Fractures and Dislocations** by Barbara Bartlett Stimson; **Postural Back Pain** by Milton C. Cobey; **Clinical Electrocardiography. I. Arrhythmias** by Louis N. Katz, and Alfred Pick; **Health Observation of School Children** by George M. Wheatley, and Grace T. Hallock; **Advances in Biological and Medical Physics, Volume IV** edited by H. J. Lawrence, and C. A. Tobias; **Primary Anatomy, Third Edition** by H. A. Cates, and J. V. Basmajian; **The Biochemistry and Physiology of Bone** edited by Geoffrey H. Bourne; **Thoracic Surgery for Physiotherapists** by Gladys M. Storey; **Clinical Studies in Neurology** by Harry Lee Parker; **The Cervical Syndrome** by Ruth Jackson; **Hypnosis and Its Therapeutic Applications** edited by Roy M. Dorcus; **Pathologic Physiology, Mechanisms of Disease** edited by William A. Sodeman; **Therapeutic Use of Artificial Radioisotopes** edited by Paul F. Hahn; **Handbook of Physical Therapy** by Robert Shestack; **Physiotherapy in Paraplegia** by Elvira P. G. Hobson; **Annual Review of Medicine, Volume VII** edited by David A. Rytand, and William Creger; **Race and Reich: The Story of an Epoch** by Joseph Tenenbaum; **Probleme und Ergebnisse aus Biophysik und Strahlenbiologie** by W. Friedrich, and H. G. Scholtz; **Implementation of the Tissue Committee** by Sister M. Theophane Machen; **Medical Research: A Midcentury Survey** by American Foundation; **Textbook of Medical Physiology** by Arthur C. Guyton; **Charter for the Aging** by Averell Harriman; **Poliomyelitis** by W. Ritchie Russell; **Electrodiagnosis and Electromyography** edited by Sidney Licht; **Plastic Repair of Genito-Urinary Defects** by George Bankoff; **Bibliographie Der Sportmedizin Und Ihrer Grenzgebiete 1955 (Deutschsprachig)** by E. M. Klauss; **Electrocardiography: Fundamentals and Clinical Application** by Louis Wolff.

physical medicine abstracts

Effect of Anticoagulant Therapy on Bone Repair. F. R. Stinchfield; B. Sandaran, and R. Samilson. J. Bone & Joint Surg. **38A**:270 (Apr.) 1956.

This investigation was undertaken to determine the possibility of a causal relationship between anticoagulant therapy and poor bone healing. Experimental animals used were 16 rabbits and 10 dogs, with an equal number of controls. A 4-inch incision was made to expose the iliac crest. The ilium was then exposed subperiostally and a semicircular disc of bone removed. After removal of soft tissue and periosteum, which was not replaced, the disc was held in its anatomic position by two tantalum-wire sutures. The wound was closed in layers with black silk sutures and was healed *per primam*. The dosage of heparin used was about 25 mg. per kilogram of body weight each day in two or three doses. The dosage of dicumarol was about 2 mg. per kilogram of body weight each day. Dosage was controlled by maintaining the venous clotting time at between 25 and 30 minutes for heparin and between 30 to 35 seconds for dicumarol. Test animals were divided into 8 groups, with at least one experimental animal of each species in each group and a like number of controls. Autopsy was performed on the rabbits 3 weeks after the operation and after 4 weeks for dogs. Representative photomicrographs were made for each group of animals. In the group given heparin 1 week before the operation for 4 days and in the group given dicumarol in the same manner, the union was less than that obtained in controls. In the group given heparin 24 hours after the operation (for 3 weeks to rabbits and 4 weeks to dogs) and in the group given dicumarol in the same manner, union was even more delayed than in the two experimental groups mentioned previously, especially with dicumarol. In the group given heparin 1 week after the operation (for 2 weeks in rabbits and 3 weeks in dogs) and in the group given dicumarol in the same manner, union was delayed to about the same extent as for the groups given the drugs preoperatively. In the group given heparin and dicumarol in combination 24 hours after the operation (for 3 weeks in rabbits and 4 weeks in dogs), more interference was demonstrated than in any other group. In the group given heparin and dicumarol combined 7 days after the operation (for 2 weeks in rabbits and 3 weeks in dogs), the delay in union was greater than that in any of the groups to which the drugs were administered singly, but less than that in the group given the combination immediately after the operation. Two possible explanations advanced by the authors for the mechanism of interference by anticoagulants with bone formation are that scaffolding in the form of the fibrin clot upon which the osteoblasts form bone may be lacking, or that the number of cells at the graft site may be diminished or the normal metabolic process in the bone matrix may be altered because of the toxic effect of anticoagulants. The authors conclude that, although union of bone is not necessarily delayed in a patient who has received anticoagulant therapy, this possibility must be considered.

Human Cerebral Blood Flow and Oxygen Consumption as Related to Aging. S. S. Kety. J. Chron. Dis. **3**:478 (May) 1956.

A review of available studies in which the nitrous oxide technic was used to determine cerebral blood flow and oxygen consumption in man reveals a distinct correlation of these functions with age. An attempt was made to limit the studies reviewed to those in which age rather than disease was the primary variable. During the first decade of life values for both cerebral blood flow and cerebral oxygen consumption are quite high. The volume of over-all cerebral circulation appears to fall rapidly at about the time of puberty and through adolescence and then to decline gradually but continuously through middle and old age. Changes in cerebral oxygen consumption occur in a similar fashion. There is good reason to believe that, despite the chance of error inherent in the nitrous oxide technic and other considerations, the values obtained in the various studies closely approximate those existing in the normal resting state at various ages in man. Since the nitrous oxide technic yields results only in terms of unit volume or unit weight of brain, the changes could be a reflection of a generalized decrease in the circulation to, and metabolism of, the individual actively metabolizing units or a progressive reduction in the ratio of their mass to that of the brain as a whole. One hypothesis attributes metabolic and functional changes primarily to alterations in the cerebral blood supply. Another is that a more fundamental cerebral derangement in aging results from the dimin-

ished metabolic demands of the brain, such as simple loss of neurons, progressive deterioration in essential cellular components, a decrease in neuronal interconnections and interaction, or a lessened functional demand as a result of the psychological and social changes that accompany the aging process. Thus, restricted cerebral circulation would follow rather than cause decreased metabolism. A possibility of obtaining some indication of the sequence of events is by means of the cerebral arteriovenous difference, which varies inversely with the ratio of cerebral blood flow to cerebral oxygen consumption. Such factors as senescence, severe anemia, or a primary circulatory deficit may obscure such an analysis, but may provide a greater insight into the aging process in the brain if applied to carefully selected subjects.

Synovial Specimens Obtained by Knee Joint Punch Biopsy. Histologic Study in Joint Diseases. H. A. Zeveley, et al. Am. J. Med. **20**:510 (Apr.) 1956.

This paper analyzes the information obtained by 55 punch biopsies done on the synovia of the knee joints of 49 patients with arthritic changes. The biopsy material was satisfactory in all but 10 per cent of the cases although most of the biopsies were obtained while the technic was still new to the authors. There was only one complication, namely, a mild, transient symptomatic hemarthrosis.

There are wide variations in the appearance of the synovium in different joints in rheumatic diseases. This is particularly true in cases of less than two years' duration. Therefore, the chance selection of biopsy sites must be considered a limiting factor. Nevertheless, in this series, 17 out of 25 patients with rheumatoid arthritis showed diagnostic evidence of the disease although the procedure was not done in most cases to confirm diagnoses. The pathologic changes found in the synovia of patients with rheumatoid arthritis, Reiter's syndrome, disseminated lupus erythematosis and dermatomyositis are so similar that biopsy will not distinguish between them.

Urate deposits in gouty patients offer a prompt diagnosis whereas uric acid studies may be normal. In neuropathic diseases of the joints, the deposits of calcium salt help distinguish them from chronic rheumatoid arthritis; however, there may be non-specific findings associated with chronic trauma.

The authors conclude that the biopsy of the synovia of the knee joint is an important practical diagnostic procedure in those diseases of the joint where arthrotomy is ill advised and where other measures have not been diagnostic.

The Relationship Between Anxiety and the Level of Peripheral Vasomotor Activity: An Experimental Study. B. Ackner. J. Psychosom. Res. **1**:21 (Feb.) 1956.

The study of the relationship between emotional disturbance and peripheral circulatory changes is difficult because of the many factors involved, including difficulty in evaluating emotions and in reproducing emotional states experimentally. An attempt to keep many of these factors constant must be made so that the investigation can be limited to emotional factors. Finger plethysmography offers the most satisfactory compromise between simplicity of application and reliability of results in emotionally disturbed subjects. Previous studies had shown that the size of the finger plethysmographic pulse volume was related to the emotional state of the subject. In the author's experiment, an investigation was undertaken to determine whether sleep induced by secobarbital would result in an increase in the plethysmographic pulse volume in anxious subjects as opposed to little or no change in relaxed subjects. The subjects consisted of a group of manifestly anxious patients, a group of psychiatric patients without anxiety symptoms, and a control group. The size of the pulse volume during the resting state and the increase in pulse volume during induced sleep differed significantly in the three groups. The group with anxiety symptoms was distinguished from the other groups by the increase in pulse volume during induced sleep. It would appear that vasoconstriction of the vessels is part of an alerting reaction to stress that diverts blood to areas that are mobilized for offensive or defensive action, but the exact mechanism for this reaction in patients with anxiety symptoms is not clear. Since the resting pulse rates and blood pressures of such patients did not differ significantly from those of the other groups, an excess of circulating epinephrine or arterenol does not appear to be an important factor in this reaction. The most likely explanation seems to be that sympathetic activity along the vasomotor pathways is increased.

Parkinsonian Reactions Following Chlorpromazine and Reserpine: Similar Reactions in the Same Patients. R. H. May, and G. E. Voegele. A.M.A. Arch. Neurol. & Psychiat. **75**:522 (May) 1956.

Four case histories of psychotic female patients are cited in which Parkinsonian reactions appeared during chlorpromazine therapy and reappeared in the same patients during subsequent medication with reserpine. The drug-induced Parkinsonian reaction seems to be physiologic, always reversible, and a function of total dosage rather than a toxic symptom. Other authors have reported that this syndrome can be produced in some

patients by large, continued doses of chlorpromazine or reserpine or a combination of the two. These observations suggest that one or more identical areas in the central nervous system are involved in such reactions and are affected by direct or referred action of the drugs. This may possibly be a specific type of reaction of the regulatory mechanism of the central nervous system and may be of therapeutic value as it has been reported that some patients with chronic schizophrenia improved after encephalitis and the development of the Parkinsonian syndrome.

Astragalectomy as a Stabilizing Operation for Foot Paralysis Following Poliomyelitis: Results of a Follow-up Investigation of 153 Cases. H. C. Holmdahl. Acta orthop. scandinav. (In English) **25**:207 (No. 3) 1956.

Followup on 153 out of series of 358 astragalectomies is reported. The operation was performed to correct foot deformities caused by poliomyelitis. Most patients contracted the disease before age 7 and were operated upon between ages 9 and 15. The operation was performed at least 3 years after the onset of poliomyelitis in all but 9 patients. Good anatomic results were achieved in 183 per cent of patients, fairly good in 47 per cent, and poor in 34.7 per cent. Good functional results were achieved in 32 per cent, fairly good in 56.9 per cent, and poor in 11.7 per cent. Patients with an equinus component clearly showed better results than those with some form of calcaneal deformity. The chance of obtaining good results regardless of the type of deformity increases inversely to the degree of paralysis in the thigh and calf muscles. A slight shortening of leg length occurred in about half of the patients; in the others, the length remained the same or was increased, probably as a result of improved function. The highest percentage of good results was obtained in patients in the 11 to 12 year age group. Roentgenography revealed that bony ankylosis had formed in 34 per cent of the patients; ankylosis was observed clinically in an additional 38.5 per cent. In patients who retained mobility the ratio of good results to poor was 2.5 to 1; in those with fibrous ankylosis the ratio was about 2 to 1; in the group with bony ankylosis the number of poor results was slightly greater than the number of good results. The risk of a poor end result is great if complete retroposition of the foot is not obtained during the operation. Good functional results were achieved in 48 out of 60 patients who exhibited complete retroposition, but in only 18 out of 57 patients with poor retroposition. Defective retroposition may allow malposition, especially of the calcaneal type, to progress. Loose bodies (generally residual parts of the extirpated talus) were noted in 10 patients, but they did not cause increased pain in weight bearing and walking. The need for permanent splints seems to depend more on residual paralysis in the hip and knee joint than on any defective result of the operation. Less than 50 per cent of the patients required an orthopedic aid after the operation. Only 2 per cent of the patients reported deterioration; 55 per cent were completely satisfied with the results of operation. The others had improved or had no opinion.

Classification of Athetosis with Special Reference to the Motor Classification. Winthrop M. Phelps. Am. J. Phys. Med. **35**:24 (Feb.) 1956.

The author presents a "motor" classification of athetosis which he thinks is important in regard to treatment and localization of parts of the extrapyramidal system. There are "twelve readily identifiable entities which can be definitely and easily recognized." The first five are "primary types" of motion which the author describes as rotary, tremor-like, dystonic, shudder, and flail. The other seven types are described as tension, non-tension, hemiplegic, neck and arm, hard of hearing, balance release, and emotional release.

Obviously this is not a classification in the logical sense. There is no single frame of reference. Tension and non-tension athetosis are admittedly temporary diagnoses which are superseded by one of the primary types. The hemiplegic and neck and arm type are topical classifications. The hard of hearing, balance release and emotional release types have special characteristics.

At least by implication all these types are clearly defined entities. Our own experience has been that each case of athetosis reveals several types of involvement.

The author has attempted to bring some order to the complex problem of athetosis and has succeeded in demonstrating that this is not an easy task.

Pathogenesis of Poliomyelitis. A. B. Sabin. Science **132**:1151 (June 29) 1956.

The author has reviewed the current literature and presented his schema of the possible pathogenesis of poliomyelitis.

Ingested virus invades the superficial epithelium of the oropharyngeal mucosa and of the lower alimentary tract and multiplies there, extending from one group of cells to another until host resistance halts further growth.

Virus in the feces is derived chiefly from mucosal cells of the lower alimentary tract. Some virus is absorbed by the regional lymph nodes. When the amount of virus in the nodes exceeds the amount which can be absorbed there is an overflow into the blood.

Virus reaching the blood is quickly removed by the cells of the reticulo-endothelial system. No significant viremia occurs however unless the virus can multiply in a variety of extraneural tissues such as lymph nodes, axillary fat, the adrenal glands and inoculated muscle.

From the sites of multiplication in the alimentary tract and the extraneural tissues, the virus may then invade the sympathetic or sensory peripheral ganglia "and if the dose is large enough and the strain of virus is sufficiently neurotropic, enough multiplication occurs in the first group of neurons to permit invasion of the corresponding area of the central nervous system." Further progression within the central nervous system would also be along "neural pathways" and would be influenced by the dose and neurotropism of the virus.

Antibody would have the function not only of completely preventing the invasion of the central nervous system but also of reducing "the amount of virus that might invade and thereby increase the proportion of non-paralytic and mild infections of the central nervous system."

Historical Landmarks in the Pathology of Involuntary Movements. J. Godwin Greenfield. J. Neuropath. & Exper. Neurol. **15**:5 (Jan.) 1956.

James Parkinson made several contributions to medical literature, the most famous of which is his "Essay on the Shaking Palsy." In his "Essay on the Shaking Palsy" he described clearly paralysis agitans. He considered it a disease instead of a syndrome which may have several causes as we consider it today. He included no pathological evidence as to the site or nature of the disease but suggested that the disease should be studied by pathological methods.

During the last third of the 19th century only two contributions were made to the anatomical basis of Parkinson's disease which are at all in line with modern views. Meynert, in 1871, suggested that paralysis agitans, as well as the movements of chorea, might be due to an altered physiological state of the basal ganglia. Brissaud, in 1895, suggested that paralysis agitans was due to vascular lesions in the substantia nigra. F. H. Lewey (1913) found concentric spherical inclusions especially in the nucleus basalis; these have since been shown to be part of the pathological picture of Parkinson's disease. But Lewey did not study the substantia nigra. In 1921 Tretiakoff insisted that lesions of the substantia nigra were always associated with symptoms of Parkinsonism if allowance were made for associated hemiplegia, and also for the delay of weeks or months in the onset of symptoms. This curious delay has been noted by others. For years neurological teaching distinguished the pathology of paralysis agitans, which was thought to affect chiefly the basal ganglia, from that of post-encephalitic Parkinsonism in which the substantia nigra was primarily damaged. Hassler later showed that lesions in the substantia nigra are the most constant findings in classical paralysis agitans. Hallervorden (1933) stressed the finding of neurofibrillary changes of Alzheimer type in cells of the substantia nigra in post-encephalitic cases belonging to all groups. He also found in some of his older cases Lewey type inclusions. Recently (1952 and 1953) it has been shown that the hyaline inclusions of Lewey type are more common and are perhaps constant findings in idiopathic cases of paralysis agitans.

A discussion is also given of the historical pathology of involuntary chorea and movement in athetosis, myoclonic epilepsy, hepatolenticular degeneration and kernicterus.

The Rehabilitation of Hemiplegic Patients. R. Berto. Minerva med. (In Italian) **47**:494 (Feb. 21) 1956.

Stellate ganglion block with procaine and subsequent administration of chlorpromazine was tried in 10 hemiplegic patients with good results. Heparin was used instead of chlorpromazine in patients with cerebral thrombosis. The weight of the paralyzed extremities was alleviated to some extent and their movements became better articulated. Patients were taught to move their extremities while lying or sitting in bed. Wires attached to the affected extremity and run through pulleys were used for this purpose. Walking frames similar to those used in teaching children to walk were also used. Patients were able to move about in these devices either alone or with assistance. Exercise in these frames appears to eliminate edema, prevent decubitus ulcers, and shorten the period of hospitalization. Since patients could resume some social activity, the treatment is both psychologically and physically beneficial. One patient, although bedridden previously for a long period, was able to walk again.

The Guillain-Barré Syndrome as a Manifestation of Infectious Mononucleosis: Report of a Case. John Q. Durfey, and John E. Allen. New England J. Med. **254**:279 (Feb. 9) 1956.

A case is reported which showed a typical picture of the Guillain-Barré syndrome in which the only manifestation of infectious mononucleosis was a markedly positive heterophile-antibody titer with an associated positive titer in the cerebrospinal fluid. This is the first such case reported.

The case was that of a four year old girl who developed a head drop and generalized weakness of almost all muscle groups. She also had dysphagia, dysphonia, respiratory distress, absence of all deep tendon reflexes,

hypesthesia from the neck down, diaphragmatic weakness, marked tachycardia, and convulsions on two occasions.

The spinal fluid protein was 30 mg. per 100 ml. and later 70 mg. per 100 ml. with no abnormal rise in cells. A heterophile-antibody titer was positive in a dilution of 1:1792 and one week later 1:448 with the use of the guinea pig kidney absorption test. Blood smears did not show atypical lymphocytes and no other manifestations of infectious mononucleosis were found. Return of function began with the lower extremities and progressed slowly and steadily upward. She recovered completely over a period of three months.

A review of the literature is given which shows that involvement of the central nervous system associated with infectious mononucleosis has been described for many years. The various types of central nervous system involvement have been classified as follows: serous meningitis; encephalitis; acute polyneuritis, and optic neuritis. In the majority of cases reported of central nervous system involvement other clinical signs and symptoms of infectious mononucleosis were present as well as a positive heterophile-antibody titer.

It is thought that in the case presented the Guillain-Barré syndrome was a manifestation of infectious mononucleosis.

Use of Acrylic Prosthesis in Treatment of Fractures of Radial Head. F. Pires de Camargo, and E. Toledo de Carvalho. Rev. Hosp. clín. (In Portuguese) **10**:395 (Nov.-Dec.) 1955.

The authors report on 5 patients with comminuted fracture of the radial head in whom an acrylic prosthesis was substituted for the radial head. This prosthesis is provided with a rustproof steel nail that is inserted into the medullary channel to hold the device in position and to prevent rotation. In this technic the radius is sectioned at the elbow and its annular ligament is protected. If necessary, this ligament is repaired before the prosthesis is fixed into position. After the device is in place, the elbow is moved in all positions then placed in a cast. Active and passive exercises are executed after a week of immobilization. To prevent subsequent hematoma, hemostasis is necessary during the operation. As a Gigli's saw will pulverize bone in the wound, resulting in ossification of postoperative hematoma, its use is contraindicated. A one-year follow-up indicated that all patients retained normal movements of the elbow and forearm gained from the operation and that complications have not ensued. The advantage of this technic is that greater physical activity is permitted and it seems indicated when bone segments are displaced to a great extent.

A Study of the Placebo Response. Louis Lasagna; Frederick Mosteller; John M. von Felsinger, and Henry K. Beecher. Am. J. Med. **16**:700 (June) 1954.

A group of 162 postoperative patients was observed for the ability of such patients to receive significant relief of pain from subcutaneous injections of placebo and of morphine. There was a significantly higher incidence of relief from morphine in the placebo reactors than in the non-reactors. Morphine and placebo are less effective analgesics in patients with persistent pain than in those with pain of short duration. Less than half of the patients who received multiple doses of a placebo responded consistently to the placebo. There was no sex difference and no difference in intelligence between reactors and non-reactors. Significant differences in attitudes, habits, educational background and personality structure were demonstrated between consistent reactors and non-reactors.

The complexities of placebo controls in clinical trials are discussed and suggestions made for dealing with this important methodological problem. A hypothesis to explain the placebo response based on their data is given as follows: "There is a certain psychologic set which predisposes to anticipation of pain relief and thus to a positive placebo response. The presence of the traits making this set is probably not an all-or-none phenomenon but rather a graded one. Other factors (such as severity of pain) also affect the response to inert agents, and the resultant of these factors, psychologic and non-psychologic, known and unknown, determines whether or not a particular dose of placebo produces an effect in a given patient."

Treatment of Nonhemorrhagic Acute Cerebral Vascular Accidents: Considerations on 260 Cases with Stellate Ganglion Block. P. W. Longo, and J. Armbrust-Figueiredo. Rev. paulista med. (In Portuguese) **48**:7 (Jan.) 1956.

Stellate ganglion block was induced in 260 patients with nonhemorrhagic acute cerebral vascular accidents. Of these patients 199 had cerebral thrombosis, 19 had cerebral thrombosis complicated by heart failure or diabetes, and 42 had cerebral embolism; none had experienced a cerebral vascular accident previously. To induce the block, 10 cc. of 1 per cent procaine solution was injected at 4-hour intervals on the first day and at 12-hour intervals on subsequent days. After 10 treatments good results were obtained in 24 of 28 patients who were treated within 8 hours after the acute attack, in 34 of 43 who were treated within 9 to 16 hours, in 23 of 45 who were treated within 17 to 24 hours, in 29 of 74 who were treated within 25 to 48 hours, and in 18 of 70 treated on the second or third day. Patients with embolism responded

most favorably; patients with cerebral thrombosis with complications did not respond at all. Electroencephalograms obtained from 36 patients immediately before the first treatment revealed slow waves of small amplitude in all patients. After the first treatment the slow waves had disappeared from the electroencephalograms of 9 of 11 patients for whom tracings were recorded 3 or 5 hours after initial therapy. The electroencephalograms of 23 of 25 patients were normal after treatment was concluded. Cerebral circulation increased in only one of 9 patients in whom this value was ascertained 5 hours after stellate ganglion block was induced. In 7 patients, clinical improvement was observed. The authors' conclusion is that stellate ganglion block is the best method of treatment for cerebral embolism, with successful results in 50 per cent of patients.

Effects of Prolonged Cortisone Therapy on the Statural Growth, Skeletal Maturation and Metabolic Status of Children. F. M. Blodgett; L. Burgin; D. Iezzoni; D. Gribetz, and N. B. Talbot. New England J. Med. **254**: 636 (Apr. 5) 1956.

Children receiving cortisone because of adrenocortical virilism, panhypopituitarism, hypopituitarism, hypoadrenocorticism or severe allergic disorders were studied over a period of four years. It was noted that within a few weeks of onset of therapy the rates of statural growth and of skeletal maturation of the children slowed down. The authors summarize as follows: "As little as 4 to 20 mg. per square meter of body surface area per day has had a marked growth suppressing effect on hypopituitary patients. About 35 mg. per square meter a day was needed to reduce the rate of growth of patients with adreno-cortical virilism from supranormal to average normal levels; administration of 35 to 50 mg. per square meter per day tended to reduce their rates of growth and skeletal maturation to subnormal levels. A minimum of 45 mg. per square meter per day was required to reduce the growth rate of endocrine-normal children."

When dosages were reduced below growth suppressing levels there was a tendency for the children to undergo a compensatory growth spurt. Cushing's syndrome findings were noted in those on growth-suppressing dosages of cortisone. No abnormal electrocardiographic changes, no osteoporosis and no abnormal chemical measurements were found except in a few cases in which the cortisone was stopped suddenly. The chemical measurements studied included the following: the pH and the concentrations of sodium, potassium, chloride, carbon dioxide, non-protein nitrogen, sugar, calcium, phosphorus, alkaline phosphotase and protein bound iodine in the serum and the urinary content of 17 ketosteroids.

It is recommended that for endocrine-normal children who have not attained sexual maturity, the dosages be reduced below growth suppressing levels from time to time to permit them to regain ground lost during intervals of relatively heavy dosage before the age when recovery of statural position is precluded by closure of skeletal epiphyses.

Newer Concepts of Protein Metabolism in Relation to Acute Phases of Disease or Injury, and to Convalescence and Rehabilitation. C. L. Reid; A. B. Clark, and H. Rusk. Postgrad. Med. **19**:206 (Mar.) 1956.

Protein metabolism during acute illness or injury and during convalescence has been somewhat of a problem through the years. Under normal conditions there remains a balance between protein synthesis and breakdown in the body with deposition of protein fragments primarily in the lymphoid tissues of the body. The rebuilding of all organs and tissues goes on by drawing materials from a large labile pool formed by the diet as well as a wide variety of fragments from the degradation of the organs and tissues.

Following stress conditions such as acute illness or trauma there results a hypertrophy of the anterior pituitary and the adrenal cortex with inhibition of the enzyme systems needed for the building up of new tissues. Since the breakdown of tissue continues during this stage there results a negative nitrogen, calcium, phosphorus, and sulfur metabolism.

In long-standing diseases such as tuberculosis or myasthenia gravis, these changes do not take place, because the body mechanisms adjust to the stimuli or become exhausted.

The authors present 30 cases of traumatic spinal cord injury in which 23 developed decubitus ulcers within the first eight weeks irrespective of the type of nursing care. They, therefore, conclude that breakdown is unavoidable and inevitable and is due primarily to trophic changes alone.

Little positive evidence is presented to substantiate the conclusions and no reason for the total lack of breakdown in almost one-third of the series is presented.

Fatalities in Myasthenia Gravis: A Review of 39 Cases with 26 Autopsies. L. P. Rowland; P. F. A. Hoefer; H. Aranow Jr., and H. H. Merritt. Neurology **6**:307 (May) 1956.

The known mortality rate in a series of 180 patients with myasthenia gravis observed since 1930 has been at least 30 per cent. The average duration of symptoms in 39 patients who died was 2.8 years. This group may represent a more malignant form of the disease than usually encountered. Thirteen patients died suddenly. Several had acute episodes of dyspnea that were relieved by neostigmine prior to the final attack; it is

suggested that these attacks are premonitory and that the maintenance dose of neostigmine should be increased and special precautions taken. All but 2 of 16 patients who were in a mechanical respirator at time of death suffered severe anoxia prior to respirator therapy, and a pathological condition was present in all such patients at autopsy. Several patients did not respond to large doses of neostigmine in the terminal stages. Use of barbiturates, opiates, or placebos in patients with ventilatory insufficiency who are not in a respirator may be dangerous. Possibly fatal complicating diseases were present in 10 patients, but muscle weakness was a prominent factor in the circumstances preceding death. Two deaths were associated with pregnancy, two with thyrotoxicosis, and ten with respiratory infection. In 17 others, an overt precipitating illness was not present. Thymomas were found in 9 of 26 patients at autopsy, hyperplasia in 6, no thymic tissue in 8, and 3 were normal. Lymphorrhages were present in the muscles of 15 patients, nodular myositis in 3, extensive myocarditis in 2, and focal myocarditis in 1. A pathological condition was found in the lungs of all but 4 patients autopsied. Elements of treatment stressed are recognition of premonitory attacks of respiratory distress, adequate medication, more cautious use of sedatives, early institution of mechanical respiration with adequate gas exchange, control of electrolyte balance, and control of infection.

Plantar Surfaces and the Weight-Bearing Problem. D. W. Robinson. Am. Surgeon **22**:442 (Apr.) 1956.

Loss of plantar surfaces presents a special problem as no supply of like coverage is available except other plantar skin that cannot be spared from the primary function of weight bearing. Since this tissue has little elasticity and there is no excess, primary closure by suture is rarely satisfactory. Conditions affecting the blood or nerve supply and underlying fascia or bones may also affect the planned corrective measure. Although the aim should be the simplest coverage possible with the easiest procedure, simple closure of a wound may place a scar over a bony prominence or in the wrong direction of skin tension. If the subcutaneous protective pad over the bone is adequate, a free full thickness skin graft from the leg, abdomen, loin, or groin will give good surface coverage but will require protection for at least 3 months. If tissue padding for protection of the weight-bearing point is needed, a local flap can often suffice as a sliding flap or more often a local rotation flap, which often covers the donor bed with a full thickness skin graft. This type of flap requires protection for a shorter time than for a flap from a distant part since the nerve supply is intact. A filletted toe flap is helpful when the defect is less than 2 cm. in diameter and is close to the base of the toe. Coverage from a distance is accomplished best by a cross leg pedicle from the thigh or calf, direct or delayed, according to the position possible for the legs, local blood supply, and age of patient. Such a flap must be protected from 6 to 12 months. Aftercare is just as important as the operation. Special shoes, metatarsal bars, arch pads, sponge rubber, or felt can be used to protect grafts. For the first 2 or 3 weeks, the patient should stay off his feet, he should wear a resilient pressure dressing for an additional 4 weeks. Graduated weight bearing with a cane or crutch is important. Usually about 3 months is required for sensation to return to free grafts and 6 to 12 months for flaps. Frequent inspection is necessary and extra precautions and rest are required when grafts are red or blistered. The author discusses problems of loss from trauma, burns, cold injury, warts, neoplasms, irradiation defects, and infections.

Cardiorespiratory Problems in Severe Poliomyelitis Observed During the Recent Epidemic. F. K. Austen; J. Koch-Werer, and R. A. Field. New England J. Med. **254**:780 (Apr.) 1956.

A review of the 17 fatal cases treated at Massachusetts General Hospital during the 1955 poliomyelitis epidemic is reported. Of this total, 11 expired due to "circulatory collapse," which in previous years would have been attributed to involvement of the medullary vasomotor center.

Ventilation studies and arterial oxygen saturation levels were determined. Artificial respiration was usually carried out on a standard positive pressure apparatus.

Pathological examination revealed primarily pulmonary edema and congestion of the lungs. In those patients who had received oxygen therapy there was evidence primarily of bronchopneumonia without edema or congestion.

The authors conclude that pulmonary edema is a major factor in the production of "circulatory collapse" and death and that involvement of the medullary vasomotor center is or little or no importance. However, the medullary centers were not examined pathologically.

Rehabilitation of the Elderly Patient with Pinned Fracture of the Hip. M. Peszcyznski. J. Chron. Dis. **3**:310 (Mar.) 1956.

A good medical examination to determine any contributing reasons for poor balance should be carried out on all elderly hip fracture patients. Preambulation training should begin as soon as the patient has regained consciousness postoperatively. He

should be encouraged to bend actively and straighten the injured leg in bed. Types of motion of the hip other than flexion and extension are generally not encouraged during the entire postoperative period. The average patient may be allowed to sit in a wheelchair and start exercises within 24 hours postoperatively. Push-ups are the best power-building exercises for the upper extremities. Except in particular cases limited weight bearing on the fractured leg should begin as soon as the patient can stand well on the uninvolved leg. A swing-to, three-point crutch walk is used. An intermittent double-step gait is sometimes used. Routine late full weight bearing is recommended. Depending on x-ray findings and the type of fracture, full weight bearing is allowed after four to five months of walking on crutches. Crutches should be shorter than usual for elderly patients and canes should have thicker handles than usual. Also, the aged patient should be allowed to bear some weight through his axillae when crutch walking.

Neurologic Changes in the Aged. MacDonald Critchley. J. Chron. Dis. **3**:459 (May) 1956.

In this paper the author discusses clinical neurologic phenomena in the aged excluding considerations which are purely psychologic. Neurologic signs in normal aged persons include:

1. Pupillary changes — a tendency toward miosis with sluggish reflexes due to altered musculature of the sphincter pupillae.

2. Ocular movement disorders — a progressive restriction in convergence occurs in the elderly.

3. Muscle wasting — a progressive shrinkage in bulk and number of muscle fibers.

4. Tremor.

5. Diminution of pain, light touch and particularly vibratory sensation.

6. Reflex changes — commonly deep tendon reflexes particularly in the lower limbs are decreased.

7. A "Parkinsonism like" syndrome is characteristic of the aged with the flexion attitude, rigidity and infrequency and slowness of movement.

The author postulates that the extrapyramidal system is more vulnerable to the aging process than other parts of the nervous system and therefore extrapyramidal signs may comprise a sort of "least common multiple" of neurologic dissolution.

Neurologic disorders peculiar to the senium include:

1. Senile tremor — an uncommon disorder that is probably familial although its clinical distinction from Parkinsonism is sometimes difficult.

2. Senile gait disorders — causes include cerebrovascular insufficiency particularly of the anterior cerebral artery and all too commonly prolonged bed rest leading to "myosclerosis" with flexion contractures and fibrosis of muscles and nerves.

3. Senile muscle atrophy — particularly noticeable in the small hand muscles and often associated with fasciculations and muscular cramps.

4. Senile chorea — very rare and associated with loss of basal cell nuclei without dementia.

5. Senile epilepsy — often no more than syncopal attacks and probably cerebrovascular disease is most important cause.

6. Giant cell arteritis — a "collagen disease" affecting the arteries causing an intense neuralgia of the scalp.

There are many problems in senile neurologic pathology that need further elucidation. These include:

1. More information on the morbid anatomy of the senile central nervous system.

2. The cause of the senile plaque.

3. Involutional changes in the choroid plexus and blood cerebrospinal fluid barrier.

4. Differences in reaction of nervous tissue to noxious influences at different ages.

5. Neurologic and neuropsychiatric aspects of precocious senility.

book reviews

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

THERAPEUTIC USE OF ARTIFICIAL RADIOISOTOPES. Edited by *Paul F. Hahn*, Ph.D. Cloth. Price, $10.00. Pp. 414, with illustrations. John Wiley & Sons, Inc., 440 4th Ave., New York 16, 1956.

Although this book is not offered as a second edition of "A Manual of Artificial Radioisotope Therapy," which was published under the same editorship in 1951, it is organized along the same lines but considerably enlarged. The number of chapters has been increased from 14 to 19, the number of illustrations from 73 to 137 and the number of authors from 16 to 29. A number of prominent authors from European institutions have been added, among them notably G. Hevesey from Stockholm, E. E. Pochin and D. W. Smithers from London. The editor has made a definite and successful effort to enlist collaborators who present various phases of radioisotope therapy with which they are particularly familiar or in which they have done original research work. This pertains particularly to the editor himself, who writes on the use of radioactive colloids in the treatment of chronic leukemia; to E. E. Osgood, who presents his experience with the use of radioactive phosphorus in leukemia and polycythemia vera; to R. H. Flocks, who describes the treatment of carcinoma of the prostate with radioactive colloidal gold; to J. H. Muller in Zurich who uses radioactive colloids in intraperitoneal applications and to U. K. Henschke, who writes on the interstitial implantation of various radioisotopes. Curiously, some of the chapters written by prominent scientists in the first book have been transferred to new authors in the present book and one may well ponder over the reasons for this duplication of effort. For example, the first chapter on "Introduction to Radiation Therapeutic Problems" was originally written by A. H. Dowdy and has now been taken over by G. Hevesey, the father of radiosotope therapy. The chapter on "Dosimetry of Internally Administered Isotopes" in the first book written by E. H. Quimby, was transferred to A. A. Yalow and the chapter on radiological physics has been switched from R. D. Evans to C. W. Sheppard. In addition to the clinical chapters the book contains useful chapters on "Availability and Procurement of Isotopes" by D. L. Tabern, on "Production and Handling of Therapeutic Isotopes" by P. F. Hahn and on the cobalt-60 teletherapy apparatus by G. H. Fletcher. The book is well printed and illustrated and the references are adequate. It can be recommended to anybody who is interested in the technical and clinical aspects of radioisotope therapy.

BIOLOGY OF POLIOMYELITIS. Edited by *Roy Waldo Miner*. Paper. Price, $5.00. Pp. 328, with illustrations. New York Academy of Sciences, 2 E. 63rd St., New York 21, 1955.

This volume comprises 36 brief articles divided into five parts: I. Poliomyelitis virus and methods of its study; II. Susceptibility of cells and organisms to poliomyelitis; III. Poliomyelitis virus variation; IV. Poliomyelitis virus and the community, and V. Immunization against poliomyelitis.

These are all basic science essays. Many will be of major interest only to biologists and microbiologists. The last two sections are likely to interest the widest group of readers because of their application to the problems of human disease and its prevention. All will be interested in the beautiful electron micrographs of purified virus preparations, with supporting data of sedimentation velocity, UV absorption spectrum, observational *versus* observed particle size, and other parameters. Descriptions of tissue culture methods using monkey kidney epithelial cells tell a fascinating story. Incidentally, the disease agent now has an official binomial designation: *Poliovirus Humanis*.

Paffenberger and Wilson report conclusively on the effect of tonsillectomy and pregnancy on polio susceptibility. In one epidemic 31 per cent of 215 cases had undergone tonsillectomy (normal expectancy, 22.5 per cent). Even more impressive, nearly half of 66 bulbar cases had had tonsillectomy. The incidence of disease in pregnant women in this one outbreak was seven times what it was in nonpregnant women.

Bodian discussed the effect of prior injections in provoking disease. Trueta narrowed this down to the extremity injected and found that paralysis was most likely to localize in that extremity. The nature of the injection is immaterial but whether it is subcutaneous or intramuscular is crucially important. Virus apparently travels up the nerve of supply of

muscles to the spinal cord — intramuscular injections are therefore to be avoided in summer and epidemics.

Many other aspects, including the changing age distribution of the disease and of course vaccines and immunity, are discussed.

This volume is not for the casual reader. It is an important landmark in both biology and medicine.

THE BACK AND ITS DISC SYNDROMES. By *Philip Lewin,* M.D. Second edition. Cloth. Price, $18.50. Pp. 942, with 371 illustrations. Lea & Febiger, Washington Sq., Philadelphia 6, 1955.

In the second edition of a monumental text on back disorders, Dr. Lewin again distinguishes himself as a physician, scientist, writer, and keen observer of human behavior. The viewpoint of the patient regarding pain, deformity, and disability is taken into consideration, and on each page the art of medicine is combined with the science.

Complete coverage is given to causes of back disability, both common and rare, with points of differential diagnosis from the disc syndrome given in most instances. Emphasis is placed on conservative management; surgical procedures employed by several surgeons are summarized and illustrated with the appropriate section. Illustrations, both line drawings and photographs, are profuse and of excellent quality.

The physiatrist should find this volume an invaluable addition to his library. While the short section devoted to physical therapy in back disorders is concerned largely with manipulation, and adds little to the specialist's knowledge of modalities employed, the discussions of body mechanics and physiatric diagnostic and treatment measures scattered throughout the book render its reading both enjoyable and highly instructive.

ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS. Vol. IV. Edited by *J. H. Lawrence,* and *C. A. Tobias.* Price, $8.80. Cloth. Pp. 356, with illustrations. Academic Press Inc., Publishers, 125 E. 23rd St., New York 10, 1956.

This fourth volume of the series, which was started in 1948, extends even farther into the various fields of biophysics than its predecessor. It testifies to the desire of the editors and their editorial advisors (Howard Curtis, L. H. Gray and Bo Thorell) not to limit the contents of these volumes largely to studies in nuclear biophysics. Eleven collaborators from prominent research institutions of the United States contributed eight papers. Some important fundamental applications of physical principles to biology are described in the chapters on "X-Ray Diffraction Applied to Crystalline Proteins" (D. Harker); "Materials for the Biophysical and Biochemical Study of Cell Division" (D. Mazia), and "Infrared Spectrometry" (N. K. Freeman). "The Problem of Information Transfer from the Nucleic Acids to Proteins" (G. Gamov and collaborators); "The Gross Composition of the Body" (W. Siri), and "A Special Consideration of the Aging Process, Disease, and Life Expectancy" (H. B. Jones) are of equal importance along biochemical and biological lines. A study of the "Lethal Effects of High and Low Temperatures on Unicellular Organisms" (Th. H. Wood), and of "Kinetics of Iron Metabolism" (R. L. Huff) complete this series of most informative articles. The book is well printed and illustrated and the reference lists are thoroughly adequate. One looks forward with great expectancy to Volume V of this series, the ambitious list of contents and the publication date of which (late 1957) are announced in the present volume.

TEXTBOOK OF OCCUPATIONAL THERAPY. With Chief Reference to Psychological Medicine. By *Eamon N. M. O'Sullivan,* D.P.M. Cloth. Price, $10.00. Pp. 319. Philosophical Library, Inc., 15 E. 40th St., New York 16, 1955.

The author, following years of interest and study, has added another textbook to the slowly growing list relating specifically to occupational therapy. This book is particularly concerned with mental hospitals and psychological medicine, but numerous references are made to the general medical and surgical fields.

There is a myriad of detail pertinent to nearly every phase of occupational therapy: personnel, administration, sections and units, analysis of craft and activities, as well as a selected bibliography. The book is interestingly written and can be recommended for house officers, occupational therapists as well as the staff of mental institutions who wish a reference text for psychiatric occupational therapy.

TEXTBOOK OF ANATOMY AND PHYSIOLOGY. By *Diana Clifford Kimber,* and *Carolyn E. Gray,* R.N. 13th edition. Price, $5.50. Pp. 850, with illustrations. The MacMillan Company, 60 Fifth Ave., New York 11, 1955.

When a textbook such as this reaches its thirteenth edition there is hardly any need to question its place in education. With the necessary additions and revisions this standard textbook is as up to date as the high demands of present day nursing education.

The authors did a fine job in condensing two major fundamental disciplines in one volume. The intricate interrelationship between anatomy and physiology is very efficiently organized without unnecessarily crossing the

territories of the respective sciences. The subjects are so well handled that the young nurse will hardly need any other reference source to gain adequate knowledge of anatomy and physiology.

This volume is highly recommended not only for students of nursing schools but, which is of special interest to the readers of this journal, to student and graduate physical and occupational therapists also.

MY LEFT FOOT. *Christy Brown,* with a foreword and epilogue by Dr. Robert Collis. Paper. Price, $3.00. Pp. 178, with illustrations. Simon and Schuster, 630 Fifth Ave., Rockefeller Center, New York 20, 1955.

Inevitably, comparisons will be drawn between this book and Carlson's earlier account of the inner frustrations of an athetoid. However, in view of Christy Brown's pitifully limited education, it is wholly unfair to attempt such comparisons, and each should be appreciated as a valuable signpost for all who seek an understanding of this challenging disease. This book points out with stark realism the frightening consequences of an unenlightened school program for training of the physically-handicapped child. Only a chance meeting with a talented pediatrician saved the author from a purposeless existence in a back room. Only the sustained interest of an enlightened and understanding social worker from Dublin's renowned School of Social Sciences helped him to persevere when the odds seemed hopeless. The story ends with the author's triumph over the twin terrors of pessimism and despair. Everyone interested in the habilitation of an athetoid tetraplegic should derive new strength and courage from Christy Brown's conquest of the impossible with only two real physical assets — an active mind and a versatile "left foot."

PELVO-SPONDYLITIS OSSIFICANS — RHEUMATOID OR ANKYLOSING SPONDYLITIS. A ROENTGENOLOGICAL AND CLINICAL GUIDE TO ITS EARLY DIASIS (Especially Anterior Spondylitis). By *Ragnar Romanus,* M.D., and *Sven Yden,* M.D. Cloth. Price, $8.50. Pp. 163, with 55 illustrations. The Year Book Publishers, Inc., 200 E. Illinois St., Chicago 11, 1955.

This book has many radiological illustrations. It is the object of the authors to illustrate the course of the disease during the many years that it usually takes to reach the final stage. A knowledge of the evolution of the disease, and its nature, is not only of therapeutic value, but also of importance from the standpoint of public welfare. Since the disease is very common among young and middle-aged men, it is important that all physicians who come in contact with young and middle-aged men should be familiar with the early diagnosis, the course, and the nature of the disease. Early recognition of the disease can give a rationale for treatment and can also make possible a choice of occupation. The authors have suggested the new term: "Pelvospondylitis Ossificans" as embodying what they believe to be the essential characteristics of the disease. The authors believe that their roentgenograpic and histological studies show that the inflammatory changes are localized not only to the apophyseal joints of the spine, but also to the vertebral bodies, the transverse and spinous processes, the discs, and the paravertebral soft tissues. The changes in these sites are wholly in agreement with those found elsewhere in those areas which we routinely recognize. This spondylitis is widespread and progresses to the greater part of the spine. It heals in ossification at a relatively early stage in the course of the disease. The arthritis in the apophyseal joints is, then, an accessory phenomenon in a widespread spondylitis. Pelvospondylitis ossificans should, therefore, be regarded as a separate entity, and not merely as rheumatoid arthritis of the spine.

A large number of cases would be diagnosed appreciably earlier if it were to become a routine procedure in every roentgen department to include a picture of the sacroiliac joints in examinations of the spine, irrespective of the clinical problem.

The entire discussion of pelvospondylitis is excellent, not only from the radiological point of view but from the standpoint of histological studies, the course of the disease, its nature, its etiology, and pathogenesis. This is a very valuable and worthwhile book.

CLINICAL STUDIES IN NEUROLOGY. By *Harry Lee Parker,* M.D. Cloth. Price, $6.50. Pp. 364. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1956.

These sketches of neurological disease might equally well have been labeled "Weekly Rounds on a Neurological Ward" for this is indeed what they are, told almost verbatim as the author guided his medical students and interns through the history, signs and symptoms of nervous disease. His style is a refreshing and radical departure from the usual dry-and-dead clinical exposition and will perhaps offend some.

By the same token perhaps it ought to have some claim as literature as well as science. The medical student is a critical and sometimes cynical fellow and he can be lost by a straw. Dr. Parker's style might easily win his audience in person and still be shrugged off in a book.

Some of the descriptions deserve rank with the classic original descriptions of disease by giants like Heberden, Bell, and Osler. The author's harrowing depiction of suffering in trigeminal and glossopharyngeal neuralgia, the gastric crises of tabes and the plight of a sufferer from Korsakoff's syndrome have

surely rarely been equaled and never surpassed in medical literature. The conviction that the author knows literary as well as medical history uncommonly well and could, for example, never be guilty of misspelling a name like Romberg is a constant delight. At the head of each chapter he brings you little vignettes of life on Dublin's streets: unforgettable descriptions of a bum, a prostitute or a fallen spavined drayhorse. Being an Irishman he is a poet and being a poet he cannot refrain — although it has little clinical bearing, from relating how a little girl, on May Eve, left a pitcher of milk, a piece of burning peat and a garland of primroses at a cottage door to appease the May Elves and Fairies.

Sticklers may complain that the book hardly deserves the sub-title "Recent Advances" or even go further and say that one learns little about nervous structure or function (there are only word pictures). A severe critic might even say that this is an effort to sugar-coat neurology.

It is very refreshing and worthwhile reading for all that and a worthy document from the island whose wars are all said to be merry but all of whose songs are sad.

THE FIELDS OF GROUP PSYCHOTHERAPY. Edited by *S. R. Slavson*. Cloth. Price, $6.00. Pp. 338. International Universities Press, 227 W. 13th St., New York 11, 1956.

Considering that it was only as late as World War II when group psychotherapy was given a significant impulse by military psychiatry, it is indeed astonishing how rapidly this form of psychiatric treatment has grown both quantitatively and in general scope. Hardly a mental hospital exists today where group psychotherapy is not practiced in one manner or another. The scope of its clinical applications can be appreciated by merely looking through the table of contents of the latest book on the subject edited by S. R. Slavson. We recall this author's pioneer works in this field and the enthusiasm they created in the reader of a decade ago to investigate personally some of the fascinating experiences described by the "dean" of group therapy.

The title of the book "The Fields of Group Psychotherapy" is certainly not a misnomer. In its seventeen chapters (by twenty-four authors) are described about as many varieties of syndromes for which patients were treated in group situations. In the opening chapter "Symptom Versus Syndrome in Group Psychotherapy", Mr. Slavson emphasizes the desirability of grouping patients on the basis of similarity of pathology. Some of the other chapters deal with mental hospitals, psychosomatic disorders, addicts, geriatrics, mothers (married and otherwise), sex and marriage problems, group therapy in private practice and industry, and the state of research in the area of group therapy. The analytically oriented discussions are replete with dynamic interpretations and illustrative cases.

The chapter entitled "Geriatrics" may be considered representative of the book's contents. This presentation like most others is easily readable. The author, Maurice E. Linden, gives us an encouraging picture of psychotherapy with aged mentally ill, if we exclude those with dementia, advanced physical disability, chronic paranoids and several other types. The senile, we are told, "is in a general state of disillusionment. Hitherto unrealized wishes convey no hope of being fulfilled now. His lifelong world of love, peace and perfection is shattered. . . . " How difficult and frustrating group therapy can be is illustrated by the following statement "For several months the group was discouragingly quiet . . . ", however, not without its rewarding aspects: "the first noticeable effect of group therapy was a pronounced change in atmosphere throughout the building. . . . The traditional atmosphere of pessimism, inactivity, stagnation, and futility began to be dissipated."

Among the virtues of group therapy is the possibility of economic utilization of a limited number of psychotherapists for as large a number of patients as is realistically feasible. Many patients require individual or combined therapy. The needs of others can be adequately met in group situations. In rehabilitation medicine we often find ourselves in group activities. Many of the experiences described in the book can find analogous clinical applications in this medical specialty. The uninitiated in concepts of group therapy would find it helpful (and most interesting) to become acquainted with Slavson's classic, "The Practice of Group Therapy" (1947) or his "An Introduction to Group Therapy" (1943) as a preliminary to the present comprehensive contribution.

PERIPHERAL VASCULAR DISEASE. By *A. J. Barnett*, M.D., and *J. R. E. Fraser*, M.D. Cloth. Price, $9.50. Pp. 219, with illustrations. Cambridge University Press, 32 E. 57th St., New York 22, 1955.

This comparatively small book on a vast subject is compact but quite comprehensive. The authors attack the subject from a fresh viewpoint. After a short historical chapter, succeeding pages are devoted to a general discussion of the anatomy and physiology of blood vessels, methods of diagnosis of arterial insufficiency, pathology, clinical features, treatment, and prognosis. Case histories illustrating various types of peripheral vascular disease are scattered throughout the clinical section. Numerous illustrations, graphs, and tables adequately complement the text.

While the clinical phases of peripheral vascular disease are well covered, the discussion of physical medicine and rehabilitation leaves much to be desired. Among the diagnostic

methods, no mention is made of the sweating test to determine the completeness of sympathectomy. Venous stasis is mentioned as one of the factors responsible for venous thrombosis but nothing is said of electrical stimulation of calf muscles as a possible preventive. And on the same subject, emphasis is laid on elastic bandaging, but the dangers of tight bandaging are not emphasized. The discussion of physical therapy in peripheral vascular disease is meager, and very little is said of rehabilitation.

The book is of value to clinicians and students of medicine. For adequate physical medicine and rehabilitation coverage, one will have to search elsewhere.

THE NATURE OF HYPNOSIS. By *Paul Schilder,* M.D. Cloth. Price, $4.00. Pp. 204. International Universities Press, 227 W. 13th St., New York 11, 1956.

The Nature of Hypnosis contains English translations of two monographs by Paul Schilder, of Vienna, written in the 1920's. One monograph has been translated for the first time; the other is a new translation of a publication that has been out of print since 1940.

The book provides a detailed description of the phenomena of hypnosis, physiological and psychological, and suggests many theories regarding the nature of these manifestations. These theories are based on the author's knowledge of physiological mechanisms and established principles of psychotherapy. In fact, the subject of hypnosis occasionally becomes completely submerged in a side discussion of psychoanalysis, which is excusable in light of the close relationship between these two divisions of medical science, as pointed out by the author. For the most part the book is philosophical in that it undertakes to lay bare the basic mechanisms of such states as amnesia, memory, and sleep, as entities in themselves and in their relationship to hypnosis. The rapport between hypnotist and subject is touched upon as a social and legal problem, but the author is more concerned with the psychology involved. The theories of Freud, a contemporary of the author, are leaned upon heavily in a discussion of the sexual roots of hypnotism, hypnotism as a state of regression, and control of suggestion by the ego ideal during the hypnotic state.

The technic of hypnosis is outlined in detail and its dangers mentioned. Application to specific organic and especially neurotic disorders is suggested, but the details of hypnotherapy for a particular patient are inadequate. Thus, the book is not a manual of hypnotherapy, but rather an excellent philosophical treatise that helps to establish hypnosis as a branch of medical science deserving of further serious consideration as a therapeutic tool.

DISEASES OF THE SKIN. By *Oliver S. Ormsby,* M.D., and *Hamilton Montgomery,* M.D. Eighth edition. Cloth. Price, $22.00. Pp. 1503, with 66 figures containing 750 illustrations and 18 colored illustrations on 11 plates. Lea & Febiger, Washington Sq., Philadelphia 6, 1954.

This classic textbook which has been used as a medical reference since its first edition in 1915 has been re-edited in order to include newer pathogenetic and therapeutic advances in the field of dermatology. In the process of re-editing much that has become obsolete has been deleted so that it remains an authoritative all-inclusive general work on skin diseases.

To those in the field of physical medicine and rehabilitation, the chapter "General Therapeutics" has special interest, for certain of the physical agents employed by physiatrists have traditionally been used by dermatologists for several generations. It is obvious from the limited space devoted to such agents that their role in the field of dermatology has become more restricted. The pharmacological armamentarium for the dermatologist has increased significantly in the intervening years.

This book will continue to have broad support from specialists and general practitioners alike.

AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS. INSTRUCTIONAL COURSE LECTURES. Vol. XII. Edited by *R. Beverly Raney,* M.D. Cloth. Price, $10.75. Pp. 287, with illustrations. J. W. Edwards, Ann Arbor, Mich., 1955.

This collection of articles written primarily for the orthopedist presents a great deal of value to the physiatrist. The scope of material is wide, covering subjects of interest to the general field of medicine such as medical writing, cardiac arrest, medico-legal aspects, disability evaluation, myelography, and physiology and biochemistry as well as orthopedic subjects.

Each article is written by an outstanding authority in that particular field and is deserving of a separate review by reason of presentation of material, excellence of writing, and profusion of illustrations.

Of particular interest to the physiatrist is the section by Dr. Arthur Steindler on pathomechanics of the sacrolumbar junction, and of the paralytic gait. Here is presented in two articles, diagnostic signs and therapeutic implications. Upper extremity amputations and prostheses are succinctly described by Dr. Charles Bechtol and Dr. Donald Slocum, summarizing much of the extensive work of the National Research Council. Surgical procedures of value in cerebral palsy are presented by Dr. G. W. Eggers, with emphasis upon those which have withstood the test of time, as well as the author's contribution of hamstring transplant to the femoral condyle.

This volume is highly recommended for a place in the library of every physiatrist, both for increasing knowledge in his own field, and for understanding the related field of orthopedics. The editor is to be congratulated for an outstanding volume in this series.

JOINT MEETING SCHEDULED

The Western Section of the American Congress of Physical Medicine and Rehabilitation will hold its annual scientific meeting in conjunction with the Southern California Society of Physical Medicine on October 31, 1956 at the Beverly Hilton Hotel, Beverly Hills, California.

9:00-10:00 a.m.

"Joint Manipulations with Demonstrations."

O. Leonard Huddleston, M.D., Medical Director, California Rehabilitation Center, Santa Monica, Calif.

10.00-11:45 a.m.

"Uses of Ultrasound."

Panel discussion moderated by David Rubin, M.D., Los Angeles. Panel members: Edward P. Reese, M.D., Lynwood, Calif.; Frank Stephen Zach, M.D., Los Angeles, and David Rubin, M.D., Los Angeles.

12:00-1:30 p.m.

LUNCHEON

"Ultrasound as Used Clinically Today in Europe."

John H. Aldes, M.D., Chief, Physical Medicine and Rehabilitation, Cedars of Lebanon Hospital, Los Angeles.

2:00-3:00 p.m.

"Electromyography."

Karl H. Haase, M.D., Chief of Physical Medicine and Rehabilitation Service, Wadsworth VA Hospital, Los Angeles.

Discussion by Robert V. Miller, M.D., Beverly Hills Medical Group Clinic, Beverly Hills, Calif.

3:00-4:30 p.m.

"The Neck-Shoulder Syndrome."

Panel discussion moderated by Rene Cailliet, M.D., Chief, Physical Medicine Service, Permanente Medical Group, Los Angeles.

Panel members: Gerald G. Hirschberg, M.D., Berkeley, Calif.; Elizabeth Austin, M.D., Chief, Physical Medicine, Los Angeles County Hospital, Los Angeles; John Jacobs, M.D., Beverly Hills, Calif., and J. William Birsner, M.D., Bakersfield, Calif.

Southern Medical Association

GOLDEN ANNIVERSARY MEETING

SHERATON PARK HOTEL

WASHINGTON, D. C., NOVEMBER 12-15, 1956

Section on Physical Medicine and Rehabilitation

OFFICERS

Chairman ..... Louis P. Britt, Memphis, Tennessee

Vice-Chairman ..... A. B. C. Knudson, Washington, D. C.

Secretary ..... Oscar O. Selke, Jr., Houston, Texas

HOSTS — A. B. C. Knudson, Frederick J. Balsam, Harry Kessler, Isador Levin, Charles D. Shields, and Charles S. Wise.

THURSDAY, NOVEMBER 15
9:00 a.m.

Chairman's Address: "A Study of Cerebral Palsy." Louis P. Britt, Memphis, Tenn.

"What Physicians Should Know About Respirators." Herbert Kent, Oklahoma City.

Discussion opened by Rachel F. Weems, Ashland, Va.

"Cost of Rehabilitation." Odon F. von Werssowetz, Gonzales, Texas.

Discussion opened by Harriet E. Gillette, Atlanta, Ga.

"Prostheses and the Older Patient." Herbert W. Park, and R. E. McGovern, Richmond, Va.

Discussion opened by George D. Wilson, Asheville, N. C.

"Indications and Use of Assistive Devices for the Weakened Upper Extremities." Robert L. Bennett, Warm Springs, Ga.

Discussion opened by Charles D. Shields, Washington, D. C.

THURSDAY, NOVEMBER 15
2:00 p.m.

"The Spastic Gait." Arthur Steindler, Iowa City.

"Physical Therapy in Intervertebral Disc Lesions." Louis N. Rudin, Baltimore, Md.

Discussion opened by Charles Stansky, Bay Pines, Fla.

"The Use of Therapeutic Exercise in Patients with Impaired Vital Functions." Jack B. Mohney, Houston, Texas.

Discussion opened by Anthony L. Brittis, Washington, D. C.

"Recent Advances in Upper Extremity Prosthetic Devices." Lt. Col. Maurice J. Fletcher, Washington, D. C.

"Training Considerations in Amputee Rehabilitation." Major Frederick E. Vultee, Washington, D. C.

Discussion opened by Frank R. Di Paula, and Edward T. Haslam, New Orleans.

Election of Officers

No other medical periodical gives you such "wide coverage" in the field of physical medicine and rehabilitation as THE ARCHIVES

If you are a teacher of physical medicine, a research worker, a physicist, or just a clinician — if you want to stay abreast of all that is new in physical medicine and rehabilitation — you *must* read THE ARCHIVES.

Each month you will find in this journal informative articles, constructive editorials, physical medicine news, announcement of new books and a wealth of abstracted material dealing with every phase of physical medicine and rehabilitation.

If you are not a subscriber to THE ARCHIVES—send in your subscription today. Sample copy will be sent on request. Subscription price $7.00 per year; Canada, $8.00; elsewhere, $14.00 the year.

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION,
30 No. Michigan Ave., Chicago 2.

Please find enclosed check for $7 ☐ or bill me ☐ for one year's subscription to the ARCHIVES.

Name.....

Address.....

City, Zone and State.....

Can't say that I like those low-slung sports jobs, old man.

Reprinted with permission from **The Caliper**, Winter 1955-56.

Portable

DUO-PULSATOR

by fischer

Supplies an entirely new Low-Volt Current . . . The Fischer DUO-PULSATOR was developed for muscle stimulation. Very easy to apply and therapeutically acceptable. Three kinds of low volt currents are available: Pulsating, with from 2 to 15 impulses per second: the surge intervals are three seconds on and three seconds off: Continuous or Tetanizing. No discomfort, little if any skin sensation. Unit sells for $195.00 (f.o.b. Glendale).

DUO-PULSATOR
MUSCLE STIMULATOR

ULTRA SOUND UNIT

by fischer

Model 3200 supplies CONTINUOUS, IMPULSE and SURGE ultra sound at output of 15 watts. The 3200 comes in a portable steel cabinet suitable for table-top use. Unit features exemplary workmanship — guaranteed for a full year. Contemporary cabinets are finished in off-white enamel or in gray hammertone metallic, with special colors on request. Model 3200 is $445.00 (f.o.b. Glendale). Console model available. Further details sent on request.

MODEL 3200
F.C.C. APPROVED U-109

MODEL 88
FISCHERQUARTZ LAMP
(Since 1928)

FISCHERQUARTZ LAMP

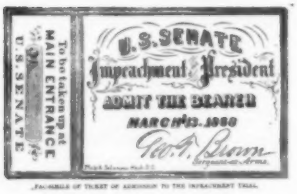
by fischer

R. A. Fischer Co.'s Model 88, Cold Quartz Ultraviolet Lamp is designed to put at the service of physicians, hospitals and clinics, all the advantages of cold ultraviolet radiations. Models are available to meet every varying condition of use. Highest quality materials and finest workmanship are guaranteed. The outstanding reputation of FISCHERQUARTZ lamps among users is your assurance of satisfaction. No better performance can be had anywhere at any price. Model 88 is $324.50 (f.o.b. Glendale).

Send for complete details to:
R. A. FISCHER & CO.
517 Commercial St., Glendale 3, Calif.
Name_____
Address_____
City_____ Zone____ State_____
(Code PM&R)

FISCHERTHERM • FISCHERSINE • FISCHERQUARTZ • PEDASINE • FISCHER ULTRA SOUND

"I looked down into my open grave"



"MR. SENATOR ROSS, HOW SAY YOU?"

In the deathly silence of the Senate chamber, the freshman Senator from Kansas looked down, as he put it, into his own grave.

On deliberately trumped-up charges, the bitterly fanatic leaders of Ross's party were trying to vote President Johnson out of office—because Johnson stood between them and their revenge on the defeated South.

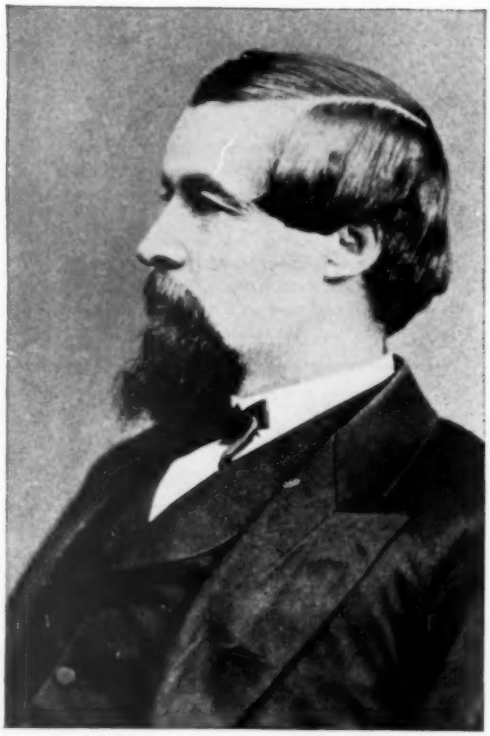
Ross, they knew, also disliked Johnson and wanted to punish the South. But, taking no chances, they had warned him to vote "guilty" or face political suicide.

And now, on that historic May morning in 1868, the verdict had come to hang completely on his vote. First falteringly, then loudly, he gave it: "*Not guilty!*"

That was sheer moral principle speaking. Edmund Ross refused to join a move he thought would wreck the historic powers of the Presidency. For this, he lost his future, lost his good name, and saved for himself only what he had saved for everyone: our democracy.

Into the whole fabric of American democracy is woven the steel-tough moral fiber of men like Edmund Ross. Braver even than battle courage, it has helped America become strong in many ways. So strong, that, today, one of the world's greatest guarantees of security is U. S. Savings Bonds.

For it is not American principal, but American principles, that back these Bonds. So, for yourself and your country, invest in United States Savings Bonds regularly. And hold on to them.



It's actually easy to save—when you buy Series E Savings Bonds through the Payroll Savings Plan. Once you've signed up at your pay office, your saving is done *for you*. The Bonds you receive pay good interest—3% a year compounded half-yearly when held to maturity. And the longer you hold them, the better your return. Even after maturity, they go on earning 10 years more. So hold on to your Bonds! Join Payroll Savings today—or buy Bonds where you bank.

Safe as America—
U.S. Savings Bonds

The U. S. Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.

MODEL T-100 PRICE $641.00

Improved FRANKLIN TILT TABLE

COMPARE DESIGN • QUALITY • PRICE!

The Model T-100 Tilt Table we introduced two years ago received prompt acceptance in the rehabilitation field and has served it well since then. Now, in answer to professional suggestions, we have completely re-designed the Model T-100 to improve its handling and use potential and to bring it within the price range of even the smallest of hospitals.

IMPROVEMENTS

- **Height reduced from 34" to 32" for easier transfer of patient.**
- **Strength and rigidity has been increased by all-welded construction.**
- **Hinged foot-board folds out-of-the-way when use as a treatment table is desired.**
- **Trendelenberg position (to 10°) is now possible, as well as the full-standing (90°) position.**

NEW PRICE — MODEL T-101		OLD PRICE — MODEL T-100		
Tilt Table, including Mattress, Cervical Bar, Abdomen Strap, Knee Strap, Crating	$395.00	Tilt Table	$511.00	
		Mattress	47.00	
		Cervical Bar	27.00	$641.00
		Abdomen Strap	24.00	
		Knee Strap	16.00	
		Crating	16.00	

Auxiliary equipment including Crutch Arms, Hand Grips, Arm Sling Suspensions, Slings and Foam Rubber Mattress, are available at proportional savings.

ALL PRICES F.O.B. NEWARK, N. J.

New MODEL T-101 Price $395.00

Write for descriptive literature.

FRANKLIN HOSPITAL EQUIPMENT CO.

116 Academy Street, Newark 2, N. J., Phone: MArket 2-5187

Designers and Manufacturers of Hospital Equipment

Specialists in Electro Medical Equipment for Physical Therapy, Rehabilitation and Diagnosis

ELCo

FRED LANDAUER CO.

11 BLENHEIM COURT
ROCKVILLE CENTRE, L. I., NEW YORK
Tel. RO 6-4527

THA

REPRESENTING LEADING MANUFACTURERS

Dependable Repair Service

Liberal Trade-Ins

Consultant Service for planning new departments

We buy and sell Good Used Equipment

OPPORTUNITIES AVAILABLE

(a) Chief; 200-bed general hospital; New England. (b) Staff; visiting nurse association; university medical center; Midwest. (c) Two; man or woman; one position requires 40-50% travel; other 10% travel; headquarters in fashionable resort city, Southwest. (d) Staff; small general hospital; San Francisco area. (e) Chief & staff; 300-bed hosp.; coll. & resort town, Colo. (f) Assistant supervisor and staff therapists; 900-bed teaching hospital; patient load includes hospital, dispensary and private outpatients, department closely associated with active prosthetic clinic; varied referral from orthopedic, chest, plastic surgery, medical and neurology services; pleasant city, easy reach of New York and Washington. (g) Chief; new voluntary general hospital; 300 beds completely air-conditioned; resort town, Southeast. (h) Staff; physical therapist; institution specializing in rehabilitation of poliomyelitis patients, affiliated university medical school; East. (i) Chief; new department, latest equipment; one of best departments in entire southwest; program for both in and outpatients; university city.

For further information regarding these opportunities, please write Burneice Larson, Medical Bureau, Palmolive Building, Chicago.

SELECTED OPPORTUNITIES

WANTED — PHYSICAL THERAPISTS: (a) Chief; dept. concerned rehab, symptomatic ther; 400 bd psy hosp; to $400; sm twn; E. (b) By 7-man clin grp, all major specialties; $350; lovely coll comm 25,000; MW. (b) Gen hosp 300 bds, apprv'd JCAH; $4200; popular resort, univ city 20,000; W. (c) CHIEF; build new, well equip'd dept, vol gen hosp 300 bds; $4800; coll twn; Carolinas. (d) Well est, highly reg 17-man clin grp; to $400 for reg'd ther; busy city 50,000; SW. (e) Ass't Supervisor; outstand'g, very lge univ hosp; $400 up; well known Eastern city. (f) Chief; supv staff of 3 in active dept, approx 700 in & out patient treatm'ts pr mo; apprv'd 200 bd gen hosp; capital city; W. (g) Chief, excel oppty to est & build new dept to be est in new, air-cond wing, 200-bd gen hosp; $4500 up; lovely resid twn 30,000; MW.

For further information please write Woodward Medical Personnel Bureau, 185 North Wabash, Chicago.

STAFF POSITION FOR REGISTERED PHYSICAL THERAPIST (MALE OR FEMALE). OUTPATIENT TREATMENT IN FULLY EQUIPPED, PLEASANT DEPARTMENT; 40 HOUR WEEK; 5 DAYS A WEEK; INSURANCE; BLUE CROSS; BLUE SHIELD; RETIREMENT BENEFITS. FOR FURTHER INFORMATION, WRITE WARD A. MERRELL, ADMINISTRATOR, REHABILITATION SERVICES, INC., 200 COURT STREET, BINGHAMTON, NEW YORK.

Registered physical therapist for established Elks Mobile Unit program, with young cerebral palsied children, in southeastern Ohio; treatment and parent instruction; orthopedic medical direction. Therapist with special training and experience in cerebral palsy required. Three hours driving per day. Station wagon and traveling expenses provided. Five day week; three weeks paid vacation; excellent beginning salary, dependent on qualifications; automatic increments. For additional information and application write Miss Grace Roberts, Cerebral Palsy Program Director, Ohio Elks Association, 553 East Town Street, Columbus 15, Ohio.

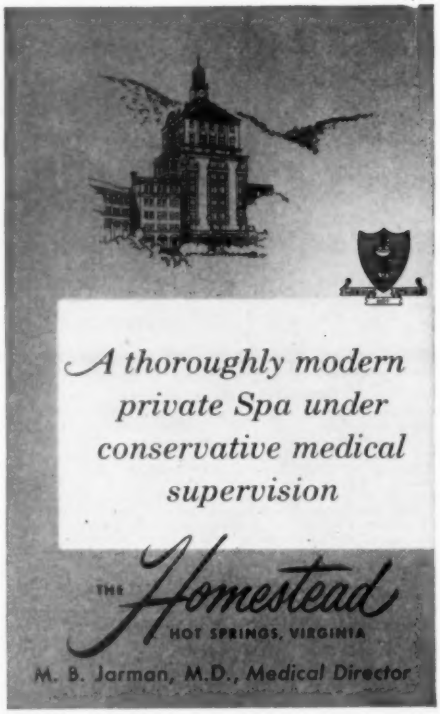
— WANTED —

Immediate placement for registered, qualified physical therapists (male or female) for rapidly expanding physical medicine and rehabilitation institute serving two hospitals, total 1000 general medical and surgical beds, in largest centrally located industrial center in Illinois.

Write: Administrator, Institute of Physical Medicine and Rehabilitation, 619 N. Glen Oak Ave., Peoria, Ill.

P. T. specialist for about 15 C. P.-Blind in school for blind children only, ages 3 to 21. Full time, salary open. N. Y. Teachers' retirement plan and social security. Board and room or living out. Position open September 1, 1956, ten months' contract renewable each year. Write Dr. M. E. Frampton, 999 Pelham Parkway, New York City.

REGISTERED PHYSICAL THERAPIST — Well established PM&R unit serving 312 bed general hospital. New England College town. Liberal personnel policies. Good starting salary. Semi-annual reviews. Living quarters optional. Laundry furnished. Write Mr. George Stoddard, Personnel Director, Mary Hitchcock Memorial Hospital, Hanover, New Hampshire.


A thoroughly modern private Spa under conservative medical supervision
THE Homestead
HOT SPRINGS, VIRGINIA
M. B. Jarman, M.D., Medical Director

Qualified physical therapist for treatment of all types of handicapped children, including cerebral palsy, under 21; established public school set-up, in Chillicothe, Ohio; school children and out-patients; medical supervision. No other therapist; fine opportunity to build up a good treatment service. Therapist with former experience required. Five day week, all year employment, with a month paid vacation. Salary up to $5000 for experienced person. For further information and application, write to Miss Grace Roberts, 553 E. Town St., Columbus 15, Ohio.

Prosthetic Improvements through Constant RESEARCH

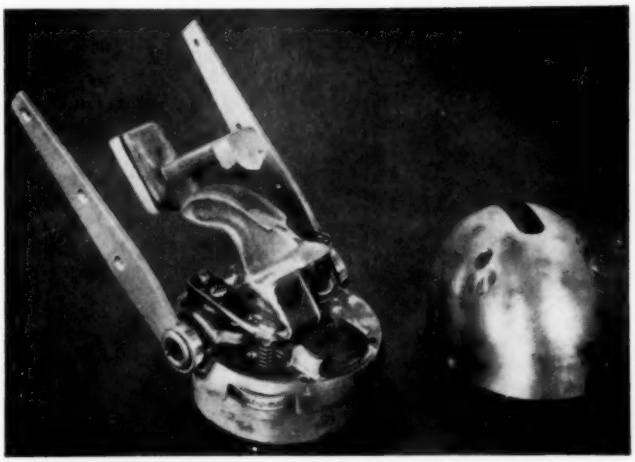
HANGER Prostheses and Prosthetic Methods have been constantly improved over the years through RESEARCH. This reseach includes cooperation with the National Research Council under the auspices of the National Academy of Sciences. Hanger, in addition, maintains a continuing research program of its own.

As a result of this continuing effort, HANGER is developing and testing new ideas, new methods, and new materials. From these activities have come many outstanding achievements, adding greatly to the comfort and ever-increasing utility of Prosthetic Appliances.

This program is cooperatively carried on by the many HANGER Companies in key cities throughout the United States. The results are available to you through any HANGER office. These efforts continue today, and will in the future — studying, planning, and developing new improvements to produce an ever-better Prosthesis.

The UCLA Course

Certified Prosthetists from the various HANGER offices have been sent to the University of California in Los Angeles to attend the Special Course on Upper-Extremity Prosthetics. This course, utilizing many of the most recent findings of engineering and prosthetics research, is designed as advanced training for men already actively engaged in rehabilitating amputees. This is but another step in the traditional HANGER policy of ensuring that our Clients receive the best Prosthetic Service possible. HANGER Clients thus benefit from the most up-to-date engineering and prosthetics research.



The Adapt-O-matic Knee

This new Knee embodies important features: Finger Tip Control of friction adjustment, Remote Control regulating swing-phase action, Self-Lubrication, Adaptability for any limb. This Knee solves the problem of change in knee action due to climatic or temperature variation—adjustment can be made inconspicuously through the clothes in a matter of moments. In addition, the Remote Control gives the wearer definite control of the limb, resulting in greater confidence and ability to swing the limb comparable to a natural leg. The Adapt-O-matic Knee, illustrated, is a recent development of HANGER research.

CINEPLASTY

Studies on muscle physiology in the cineplastic muscle motor have been conducted at the Army Prosthetics Research Laboratory and Navy Medical Centers. HANGER has been extremely interested in cineplastic developments, and has furnished a number of Prostheses in connection with this research. As a result, HANGER has developed the "Cinematic" Arm, designed for application to patients with cineplasty operations.

Hanger PROSTHESIS

AVAILABLE AT AUTHORIZED FACILITIES IN THE FOLLOWING CITIES:

Eastern Region:

BALTIMORE 1, MD.
BOSTON 16, MASS.
CHARLESTON 2, W. VA.
CHARLOTTE 2, N. C.
NEW YORK 11, N. Y.
PHILADELPHIA 7, PA.
RALEIGH, N. C.
RICHMOND 19, VA.
ROANOKE 12, VA.
WASHINGTON 13, D. C.
WILKES-BARRE, PA.

Southeastern Region:

ATLANTA 1, GA.
BIRMINGHAM 1, ALA.
COLUMBIA 5, S. C.
JACKSONVILLE, FLA.
KNOXVILLE, TENN.
MEMPHIS, TENN.
MIAMI 37, FLA.
MOBILE, ALA.
MONTGOMERY, ALA.
NASHVILLE, TENN.
NEW ORLEANS 19, LA.
ORLANDO, FLA.
SHREVEPORT, LA.
TAMPA 2, FLA.
WEST PALM BEACH, FLA.

Central Region:

COLUMBUS 8, OHIO
PITTSBURGH 30, PA.

Midwestern Region:

CHICAGO 5, ILL.
CINCINNATI 2, OHIO
DALLAS 1, TEXAS
EVANSVILLE, IND.
INDIANAPOLIS 2, IND.
OKLAHOMA CITY 3, OKLA.
PEORIA 4, ILL.
ST. LOUIS 3, MO.

new ease in Ultrasonic treatment

With ultrasonics becoming more and more indicated for treatment of a host of conditions ranging from Arthritis to Herpes Zoster, the ease of application becomes increasingly important. After six years of research, working in close cooperation with physiatrists and therapists, Birtcher engineers have developed a new transducer that is instantly adaptable to the five most desired treatment positions . . . to suit any technic in skin contact or under water. A flick of the operator's finger changes positions and locks the contour molded rubber handle in the most comfortable and effective treatment position. The 5 position transducer is available only on the new MEGASON V . . . the newest, ruggedest and most dependable ultrasonic machine available to medicine.

A large collection of medical reprints on ultrasonic therapy is yours for the asking. They cover in detail the indications and contraindications for ultrasonics in the treatment of arthritis, bursitis, sinusitis, peripheral vascular disease, Herpes zoster, low back pain, traumatic injuries, and a host of other conditions.

behind the
hands that heal

THE BIRTCHER CORPORATION

the world's largest volume producer
of electro-medical-surgical devices

APM

THE BIRTCHER CORPORATION Dept. 956
4371 VALLEY BLVD., LOS ANGELES 32, CALIF.

☐ Send me the collection of medical ultrasonic reprints

☐ I would like a demonstration of the MEGASON V in my office.

*Dr.*_____

*Address*_____

*City*_____ *Zone*____ *State*____